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THE DIAGNOSIS AND TREATMENT OF CHOLECYSTITIS*

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In a discussion of gall-bladder disease here on the 50th anniversary of the founding of the Johns Hopkins Hospital, I think it fitting to consider briefly the diagnosis and treatment as it was 50 years ago, the changes that have been made in the interval, and the part that some of the members of the staff of this hospital have played in its evolution.

The founding of the Johns Hopkins Hospital marked a new era in medicine and medical education. The "big four"—Welch, Osler, Halsted, and Kelly—and their early associates did more by their example to raise the plane of medical education in the United States than had ever been done before or has been done since. At that time, modern surgery was in its infancy and surgical treatment of the biliary tract had just begun. The methods of diagnosis and treatment of few conditions have been changed more since the founding of this hospital than have those of our subject today. While the beginning of the modern treatment of biliary tract disease was coincident with the founding of this hospital, it was not entirely coincidence, since the members of the staff here have contributed so much.

Historians generally give Jean Petit credit for being the first to demonstrate in 1743[32,43,45] that it was possible to remove gall stones surgically. He operated only when the gall bladder was connected with the abdominal wall by dense adhesions or by a fistulous tract. Practically no further progress is recorded until 1859[45] when Thudichum proposed two-stage cholecystostomy. Bobbs of Indianapolis in 1867[17] had performed the first one-stage cholecystostomy in America under the impression that he was operating on an ovarian tumor. Marion Sims[41] in 1878 performed cholecystostomy unsuccessfully and Kocher the same year in Germany performed this operation successfully.[17]

As many of you know, it was shortly after this, in 1881,[24] that Dr. Halsted with so little precedent established, operated alone in the middle of the night on his mother. He removed a quantity of gall stones from an inflamed gall bladder and prolonged her life for at least two years.

The first cholecystectomy was performed in Germany in 1882 by Langenbuch.[19] His success was soon repeated by others, Courvoisier[5] in 1890 reporting forty-seven cases. The acceptance of this operation in England was delayed by Lawson Tait,[42] who insisted that the entire possibilities of the treatment of gall stones had been summed up in Marion Sims' original work on cholecystostomy. The first cholecystectomy in America was performed in 1889 by Ohage.[29] It was shortly after this that Naunyn[28] in 1892

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†Dr. George Wadsworth has been of great assistance in the preparation of this paper.

in Strassburg published his famous monograph on cholelithiasis.

Diagnosis fifty years ago had to be made from the history and physical examination alone. To have his condition diagnosed the patient had to be already labelled by a history of jaundice or colic. Osler, in 1891,[30] commented on intermittent pyrexia in common duct obstruction by stone and attached considerable diagnostic significance to this. It is interesting to note that even at that early period Osler was emphasizing the value of surgical treatment. An interesting sign is mentioned by Frerichs,[10] who was Professor of Medicine in Berlin in 1860. He stated that a useful procedure in diagnosis was to listen for the rattling produced by the concussion of multiple stones when the gall bladder could be palpated. Jean Petit[32] earlier had described this as being similar to the sound elicited when a bag of nuts is struck.

Thus fifty years ago, cholecystostomy was being done rarely and cholecystectomy still more rarely. While the only method of diagnosis was by history and physical examination, the men of that day must have been experts in that field. I wonder what we would think today if we found a surgeon listening for gall stones.

Halsted in 1892[36] introduced the method of draining the common duct by means of a catheter in the cystic duct, although in that case he had not opened the common duct. Later he developed this for use in cases where the common duct was opened and employed it throughout his career. A decade later, Dr. Halsted[13] was emphasizing the brilliant and unexpected improvement which could be brought about by drainage of the common duct in patients extremely ill from the effects of common duct obstruction. At this time, he introduced also a method for opening the common duct from behind the peritoneum in cases where dense adhesions were found in front.

In 1898, many surgeons preferred to wait in cases with common duct obstruction for the duct to thicken before attempting surgery because of the difficulty of suturing the thin-walled duct. Dr. Halsted[14] insisted at this time that it was to the patient's benefit to drain the common duct at the earliest possible moment. It was then that he developed his miniature hammers to facilitate the suture of the duct. And in order that there should not be any excuse for delaying operation, he demonstrated both experimentally and clinically that suture of the unthickened duct could be readily accomplished.

Riedel of Germany at this period was outstanding in Europe in biliary surgery and was a proponent of the two-stage cholecystostomy. Halsted[15] actively sponsored the one-stage procedure on the grounds that it was frequently impossible to remove stones when only one finger could be introduced through a small hole in the gall bladder.

Finney[9] in 1902 described a new technic for cholecystectomy whereby peritoneal-muscular flaps were turned down from the gall bladder, the gall bladder mucosa shelled out and the flaps sutured over the bed. By turning down a peritoneal cuff on the cystic duct, he closed it securely and suggested that drainage of the abdominal wound in such instances was unnecessary. He very successfully used this procedure, closing without drainage in a number of instances. Halsted approved of efforts to avoid the development of biliary fistulæ after operation and he often emphasized their dangers at a time when many regarded them as unimportant. Osler[31] was quick to encourage surgical treatment for biliary tract disease and with Halsted and Finney emphasized the value of early treatment. Yet as late as 1916, we find in the writings of prominent men such statements as, "Surgery should be resorted to in common duct obstruction when the obstruction persists for more than three months."

Twenty-five years ago the situation had undergone rather marked change. At the time of the 25th anniversary I had just succeeded George Heuer as Resident Surgeon while Walter Dandy was first assistant and Mont Reid was second assistant. The Johns Hopkins Bulletin, Vol. 36, contains a picture of Halsted with Finney, Bloodgood, McClure, Hugh Young, Cushing, Richard Follis, James Mitchell, Robert Miller, and Robert Churchman, and George Heuer. While this picture was being taken, Sir William was standing in front of the group helping the photographer obtain smiles.

At that time surgical operation had definitely been established in the treatment of gall bladder disease. Although there were

still those who tried to postpone surgery, the question had moved on from whether operation should be resorted to at all to whether cholecystectomy or cholecystostomy should be done. Debate was waged also over the question of whether operation should be done in cases of asymptomatic stones.

Kelly was the first[4] American gynecologist to insist that the gall bladder be examined in the course of gynecological operations and, even though asymptomatic, that stones be removed if found. I recall an interesting incident in connection with this. Dr. Kelly had just performed a gynecological operation and in the course of his usual exploration of the upper abdomen he had found that the gall bladder contained four stones with one in the common duct. So after the completion of his first procedure, he redraped the patient for an incision over the gall bladder. Dr. Osler happened to come into the operating room at this time and asked what the procedure was to be. Kelly replied that he was going to remove four stones from the gall bladder and one from the common duct. His original incision of course was covered by the drapes. Dr. Osler decided to watch the operation since Kelly had ventured so positive a prediction and you can well imagine his surprise when it turned out just as Kelly had said it would.

At this period, Mayo Robson[38] and Kehr were actively sponsoring cholecystostomy as opposed to cholecystectomy. W. J. Mayo[25] in 1905 reported 1,000 biliary tract operations and of these about 70 per cent were cholecystostomies. It is interesting to note the changes in opinion on this subject. Deaver[6,7,8] for example in 1908 actively opposed cholecystectomy unless the gall bladder was greatly diseased, but in 1920 he was as convinced of the efficacy of cholecystectomy.

Twenty-five years ago, diagnosis, too, had made rapid strides. The x-ray was beginning to be used as an aid in the detection of calcium gall stones. Bauer's[1,2] galactose test which had been introduced in 1906 was being used to determine liver function. Here at Hopkins, Dr. George Whipple[46,47,48,49] was making extremely extensive and significant studies of jaundice, blood lipase and fibrinogen in liver damage, and other studies of liver function and experimental liver damage. Rowntree[40] and Hurwitz and Bloomfield had originated the phenoltetrachlorphthalein test of liver function, and Horwitz and Bloomfield[3] were studying the sugar tests of liver function.

Kussmaul's[18] origination of the stomach tube in 1869 had been followed by numerous investigations for a method for introducing a tube into the duodenum and finally various men reported obtaining bile regularly by this method. It was not until Meltzer[26] of the Rockefeller Institute in 1917 had demonstrated that the introduction of magnesium sulphate into the duodenum would cause the gall bladder to discharge its contents that the possibilities of this procedure were clear. Lyon,[20,21,22] a Hopkins' graduate, and Rehfuss,[33,34] quickly followed this up and established the duodenal tube as an invaluable adjunct in diagnosis.

The last twenty-five years have seen equally profound advances. We have seen cholecystectomy definitely established as the operation of choice; and the question of whether to operate in cases of asymptomatic stones has been settled in favor of operation. I recall that when I went to Detroit in 1916 we were much criticized at the Henry Ford Hospital because we had instituted cholecystectomy as almost the routine operation from the start.

New and advanced methods of diagnosis have been evolved—Graham's[12] method of cholecystography in 1925, the icterus index by Meulengracht[27] in 1920, and the van den Bergh[44] in 1918. Rosenthal[39] has introduced the bromsulphalein test of liver function, which is a modification of the phenoltetrachlorphthalein test evolved here at Hopkins by Rowntree and his associates. Long experience with it has established biliary drainage at the head of our diagnostic methods at the Henry Ford Hospital. Newer hepatic function tests such as the hippuric acid tests are still in a process of development.

And with all these developments, one should not believe that all the questions of biliary tract disease have been settled. One of the outstanding things to be learned in a review of the history of any disease is that, in such a constantly changing field as medicine, any prediction is likely to be dangerous. To demonstrate this we have only to remind ourselves of how Lawson Tait opposed cholecystectomy on the ground that

Marion Sims in 1878 had exhausted the possibilities for the treatment of gall stones in his treatise on cholecystostomy.

The question which now keeps coming up is as to whether cholecystitis is on an infectious or chemical basis. I feel we should keep an open mind on the subject. It seems that the admirable five year study of this question by Rehfuss and Nelson[35] is almost conclusive in favor of the infectious basis at least as the starting point. There are many outstanding men, however, our own Dr. Gatch for one, who feel strongly in favor of the chemical metabolic theory.

I would like to give you an account of our experience at the Henry Ford Hospital in the handling of biliary tract affections and some of the things we have learned from it.

The Diagnosis of Chronic Cholecystitis and Cholelithiasis*

The presence or absence of gall bladder disease should be determined accurately in every patient who complains of persistent indigestion. For clinical experience confirms the fact that "dyspepsia" or epigastric distress is the most frequent and often the only complaint in these cases. At the Henry Ford Hospital in 1937, 1,915 patients were treated for complaints referable to the upper gastro-intestinal tract. Of these, 336, or 17.6 per cent, were found to have gall bladder disease, the diagnosis being substantiated by definite laboratory and x-ray evidence.

In the evaluation of this diagnosis, the clinical evidence is still of tremendous importance in spite of the valuable refinements of diagnosis which have evolved in the last twenty years. One still sees occasional cases where the refined methods show normal findings and the characteristic clinical evidence is the only real clue to the correct diagnosis. In such occasional cases, it is important not to be misled by the absence of evidence from the refined methods.

As noted above, epigastric fullness or bloating is the most frequent and often the only clinical symptom. This symptom is often very distressing and difficult to relieve. There may be associated pyrosis. As regards the pain of gall stone colic, it is important to note that it may start either in the epigastrium or under the right costal margin and that it may radiate either to the interscapular region of the back or to the inferior angle of the right scapula. The subsidence of the severe pain, slight elevation of temperature, and leukocytosis after a few hours, in uncomplicated gall stone colic, is a great aid in differentiating this condition from acute cholecystitis, in which the above findings tend to persist. Jaundice may occur in the hepatitis secondary to acute cholecystitis, or in the intermittent form with common duct stone. The classical triad of symptoms occurring in common duct stone cases needs no elaboration.

In the physical examination of these cases, the most important pitfall is to misinterpret chronic irritable colon or simple colitis tenderness for gall bladder tenderness. Such confusion can be avoided best by examining the patient in the sitting position and palpating upwards against the liver edge and into the gall bladder area. The transverse colon tends to drop away from the costal margin when the patient sits up. When the above differentiation is difficult, Carnett's sign may be of considerable aid. It should be noted furthermore that a palpable mass in the gall bladder region may represent carcinoma of the gall bladder, empyema, hydrops, or a gall bladder packed with stones. Occasionally, in patients with a very thin abdominal wall, the latter finding may be demonstrable. In carcinoma of the gall bladder, a lapet of liver may be carried below the costal margin by the growth of the tumor.

Although the clinical evidence is still of great importance the refined methods of diagnosis have added tremendously during the past twenty years to the percentage of correct diagnosis of gall bladder disease, especially in the group of patients who have mild symptoms or no localizing symptoms at all. In the study of these cases by our Gastro-Intestinal Division, the following examinations have proven to be especially helpful: (1) duodeno-biliary drainage, (2) cholecystography, (3) various jaundice studies, and (4) liver function tests which are of value both in jaundiced and in non-jaundiced patients with chronic gall-tract disease.

1. Duodeno-biliary Drainage: This examination is a highly technical procedure

*I am grateful to Dr. J. G. Mateer for his contributions in this section and in the section "Medical Management of Cholecystitis."

which gives valuable information, provided two conditions are met. In the first place, it is necessary to have a nurse in charge who has had experience with this procedure and who is able to quickly meet the various difficulties which frequently occur in the conduct of this examination; and, in the second place, it is essential that the bile should be examined by a microscopist who really knows the cytological findings occurring in the bile. Biliary drainage is a waste of time if the above conditions can not be met. If properly conducted, biliary drainage affords the following valuable information: First, the failure to get any of the dark colored "B" bile, or gall bladder bile, after the duodenum has been stimulated at least three times (the last time by olive oil), indicates impairment of gall bladder function and has the same significance as the non-visualization of the gall bladder in the cholecystograms. As Carman once stated, no gastro-intestinal diagnosis can be too strongly fortified with evidence. In the second place, the combined finding of the finely granular orange, calcium bilirubinate pigment in association with clumped cholestrin crystals suggests either gall stones or gall sand. Although it is not definitely diagnostic of stones, it does indicate definitely at least some degree of gall bladder pathology. The combination of pigment and crystals occurs in 65 to 70 per cent of gall stone cases. In the third place, the finding of bile-stained clumped pus cells is indicative of cholangitis. The certainty of this diagnosis is increased if there is associated bile stained common duct epithelium or bile stained colonies of bacteria. These findings occur early in the pathogenesis of gall tract disease, often before any x-ray evidence is apparent.

2. Cholecystography: Even though it does not differentiate the calculus and non-calculus cases, non-visualization of the gall bladder in the serial films is the most valuable of the cholecystographic signs, since it occurs in such a high percentage of patients having gall bladder disease. This sign is usually reliable when obtained in the first set of cholecystograms. In borderline cases, however, its reliability should be confirmed by repeating the cholecystograms after the patient has been on a short period of intensive medical management. Or, it may be repeated promptly. Cholecystography, by making possible the demonstration of negative density as well as positive density stones, makes possible a total diagnosis of 35 per cent of gall stones subjected to x-ray examination. When obtained, this is the most gratifying of all diagnostic findings, since it definitely differentiates the calculus group of cases. In a small percentage of cases, normal cholecystograms may be obtained when gall stones are present. Therefore, in the presence of positive clinical data, normal cholecystograms should not be allowed to mislead one from making the correct diagnosis.

3. Jaundice studies: In any jaundiced patient, the possibility of common duct stone must be considered in differential diagnosis. In our clinic, the following jaundice studies are carried out routinely:

(a) Stools are examined daily for the presence of bile, and also for occult blood.

(b) By biliary drainage we determine whether any bile is entering the duodenum.

(c) The serum bilirubin curve is determined by the use of the icterus index and quantitative, indirect van den Bergh test.

(d) The differential diagnosis between obstructive and hepatic jaundice is further corroborated by the following indirect methods, *i.e.,* the galactose tolerance test, the total blood cholesterol and esters, and the blood phosphatase.

(e) The following x-ray studies are carried out, *i.e.,* plain gallbladder films, barium meal examination of the stomach and duodenum, and barium enema, to rule out metastatic carcinoma of the liver arising from gastric or colonic carcinoma, or primary carcinoma of the duodenum, as causes for the jaundice, and

(f) Hemolytic jaundice studies are conducted, if indicated. These jaundiced patients are kept in the hospital for a week or ten days of intensive daily study. In order to obtain the most reliable results the above studies should be carried out early in the course of the jaundice, and these tests should be repeated in order to follow the course of the jaundice, and in order to determine the development of any secondary liver damage in the obstructive cases. In order to avoid error in the interpretation of these various repeated tests for different liver functions, it is absolutely es-

sential that the results of the various tests should be interpreted in relation to the particular stage of the jaundice or underlying disease process. If jaundiced patients are studied in this manner, one seldom has any difficulty in differentiating obstructive from hepatic jaundice. It is not always possible before operation, however, to differentiate malignant obstruction of the common duct from impacted common duct stone. On the other hand, the diagnosis of a ball-valve stone is usually not difficult.

In our obstructive jaundice cases, whether due to common duct stone or other organic obstruction of the common duct, we routinely determine the blood prothrombin during the diagnostic period and then give vitamin K with bile salts three times a day for four days before operation, and also for about seven days after operation, in order to prevent the bleeding tendency of postoperative jaundice cases. The value of intravenous glucose and blood transfusions in this operative group of jaundiced patients has, of course, been recognized for some time.

4. The hippuric acid liver function test is a simple, sensitive, and inexpensive laboratory test, which should be used both in jaundiced and non-jaundiced patients with chronic gall tract disease for the estimation of the degree of associated liver damage present. It is our routine practice to do an hippuric acid liver function test on all of our gall stone cases before we start to prepare the patient for operation. The patient is then placed on a high carbohydrate diet, with supplementary intravenous glucose therapy, in order to rapidly improve liver function over a four-day period. At the end of this period, the hippuric acid liver function test is repeated in order to be sure that the patient's liver function is satisfactory for surgery.

The bromsulphalein liver function test can also be carried out in the non-jaundiced cases, and the findings are reliable when there is dye retention at the end of thirty minutes. As this test is usually carried out, however, it is not as sensitive an index of liver damage as the hippuric acid excretion test.

Harrup's bilirubin excretion test for liver function, like the hippuric acid test, is a relatively sensitive test. We have not used it as a routine clinical procedure, however, because of the cost of purified bilirubin.

Management

A. *Medical*

In those cases of chronic cholecystitis not presenting any definite evidence of gall stones, it has been our custom to place the patient on medical management with further observation.

The program of medical treatment has been as follows:

1. Any primary foci of chronic infection are usually eliminated.

2. The patient receives a program of general upbuilding treatment, with correction of any faulty habits of eating, drinking, bowel function, etc.

3. The patient is placed on a well-balanced diet containing an average amount of animal fat, *e.g.*, cream or butter. This provides the usual effective stimulus for the emptying of the gall bladder. If the patient should have gall stones, the fat in the diet may cause some distress; but if it does it serves the useful purpose of causing one to suspect the presence of gall stones. One may then be forced to curtail the fat in the diet.

4. The administration of bile salts before each meal is, of course, extremely helpful in the treatment of this group of cases.

If the patient's epigastric distress cannot be cleared up by a comprehensive program of medical management, and if all other possible causes for the distress have been carefully ruled out, one has obtained additional clinical evidence strongly suggesting not only cholecystitis but also the presence of gall stones.

B. *Surgical*

When a diagnosis of cholelithiasis is established, the problem of management and advice to the patient presents itself. This is a real problem in those cases without symptoms, in which cholelithiasis is discovered accidentally. Such persons are not demanding relief of symptoms, but are interested in what the future holds for them.

We must all realize that in the past, surgical treatment of cholecystic disease has not answered all the problems. One of the main reasons for this is that surgery has been resorted to after too long a delay. If the diagnosis is not made in the incipient stage of the disease, and surgical treatment

instituted, then, we cannot expect 100 per cent cures! Removing a diseased gall bladder when the liver and all the hepatic ducts are diseased, too, cannot be expected to alleviate all the difficulties. We must work toward earlier diagnosis and earlier treatment if surgery is to answer more of the problems of cholecystic affections.

Persons with asymptomatic stones are confronted with the following dangers which should be explained to them:

1. Impaction of a stone in the cystic duct, with the development of acute hydrops or empyema of the gall bladder, which condition sometimes necessitates an operation when conditions are not optimum. Empyema may progress to perforation into the general abdominal cavity, causing peritonitis, or the neighboring viscera may become involved in the process, so that subsequent operation is greatly complicated. Intestinal obstruction from a gall stone which has eroded through the gall bladder wall into the duodenum is a surgical curiosity, but has been reported a number of times.

2. Common duct obstruction or stones in the common duct without obstruction. This usually results in jaundice, and occasionally ascending cholangitis and focal areas of suppuration in the liver. Prolonged obstruction results in a general liver damage of the cirrhotic type. Common duct surgery is more difficult than simple cholecystectomy, hospitalization is more prolonged and increased mortality and morbidity rates have been reported.

3. Danger of carcinoma. We have recently reviewed 36 cases of carcinoma of the gall bladder in our hospital, and stones were found in 22 of 25 cases in which the gall bladder was opened. In the light of our present knowledge, carcinoma of the gall bladder must be attacked in a prophylactic way, because the mortality after gall bladder carcinoma has developed is between 95 and 100 per cent. There is one five-year cure in our series. The almost constant association of gall stones with gall bladder cancer does not prove etiological relationship, but it is very suggestive and is all we have to work on at the present time.

4. Pancreatitis. The frequent association of pancreatitis (acute and chronic) with cholelithiasis is also suggestive of a causal relationship.

5. Focal infection. In the past five years, we have removed twenty-two gall bladders in an attempt to clear up all foci of infection in patients with arthritis with striking results in a few of these patients. The recent work of Rehfuss throws an interesting light on this relationship.

If treatment is indicated on account of symptoms or the possibility of the complications just enumerated, it should be surgical. If a patient refuses operation, or a clear-cut contraindication to operation exists, medical treatment as previously outlined should be instituted. In some cases, symptomatic relief may then be obtained, but the risk of subsequent complications persists.

Cholecystectomy is the procedure of choice in the surgical treatment of chronic cholecystitis. Cholecystostomy or ideal cholecystotomy with removal of stones are rarely indicated.

Since the operation is an elective one, we have time to obtain a thorough preoperative check. We have mentioned the evaluation of the condition of the liver, and the use of glucose preoperatively. Most of these patients are of such an age that a check of the status of the heart by a cardiologist, and an electrocardiogram are comforting. Obesity, *per se,* is not a serious factor, other than increasing the technical difficulties of the operation. The presence of intercurrent respiratory infection, both acute and chronic, should be ruled out carefully.

Acute Cholecystitis

The practitioner who turns to the current surgical literature for advice on the management of acute cholecystitis is not likely to receive much help, particularly if his reading is extensive. For, paradoxically enough, the more he reads, the greater will be his confusion. He will find authorities of equal eminence diametrically opposed in their ideas regarding the optimum time for operation in acute cholecystitis. Nor is the mental confusion on this subject limited to the authorities and the neophytes, for the average surgeon follows neither school of thought but relies on that sixth sense, commonly known as clinical judgment.

a. *Diagnosis.*—The diagnosis of acute cholecystitis is almost entirely clinical. Most of the technical aids which are so essential to the diagnosis of chronic cholecystitis cannot be utilized in acute cholecystitis because of the possibility of their being harmful to the liver parenchyma. The only exceptions to this rule are (1) the flat x-ray plate of the abdomen (which is only helpful if positive density gall stones are present), and (2) certain of the liver function tests. The weakness of the liver function tests lies in their lack of sensitivity. They are positive only when between 70 and 80 per cent of the liver function has been destroyed. The galactose tolerance test is not contraindicated in suspected acute hepatitis and should have a more general use in order to rule out those cases of hepatic insufficiency which stand operation so poorly, a point that has been so repeatedly emphasized by Ivy.[16]

However, in spite of the lack of diagnostic aids, acute cholecystitis is not a difficult disease to recognize clinically, for a correct preoperative diagnosis was made in 96 per cent of our cases.

History.—The importance of early surgery for gall bladder disease is emphasized by noting that only 5 per cent of the cases in our series had not had symptoms referable to the biliary tract prior to the acute attack, and 86 per cent of the patients had received medical treatment.

Symptoms.—Pain, nausea, and vomiting are the outstanding symptoms of acute cholecystitis. They were present in 90 per cent of our cases. Clinical jaundice was noted in one-fourth of the patients, and one-fifth of them complained of chills at the onset of the attack. The pain and tenderness were located in the gall bladder region in 95 per cent of the cases, thus accounting for the high number of accurate diagnoses.

The maximum temperature before operation would appear to be of some prognostic value, because the death rate of patients whose temperature was above 102° before operation was three times the rate of those whose temperature did not reach this level, and the one patient whose temperature went above 104° died after surgery.

Acute cholecystitis incites a prompt leukocytic response. A leukocyte count of above 15,000 white blood cells per cubic millimeter is an index of the seriousness of the condition, for in our cases the death rate was double the mean rate in those whose leukocyte count ranged above 15,000 per cubic millimeter. We have always rather arbitrarily used the figure of 20,000 per cubic millimeter as indicating impending gangrene of the gall bladder and as a definite indication for immediate operation.

Management.—The management of acute cholecystitis is, in the main, an individual problem. Definite rules for handling are difficult to lay down, and only generalizations can be made. The mortality in a group of 320 consecutive cases operated upon at the Henry Ford Hospital was 5.3 per cent. We have, for many years, practiced early operation, *i.e.*, the patients were operated upon as soon as they were diagnosed and properly prepared for operation.

I would like to explain what I mean by early operation, as there is considerable confusion in the literature over the terms "early" and "delayed" operation. We do not feel that any case should be operated upon before adequate preparation is completed, but that every patient should have a period of very thorough preparation before operation, as indicated in the individual case. However, we see no reason to delay operation beyond this period. This, of course, means that the patient will be in the hospital three or four days or more before operation. The only exception to this is that cases in which a complication such as gangrene or rupture of the gall bladder seems impending are operated upon immediately. A review of our cases shows that in former years when we operated earlier than we do now in the course of the disease, the mortality in cases operated upon within 25 hours after onset was 8.4 per cent. The mortality in patients operated upon 72 hours or more after onset was only 3.4 per cent. An identical observation was made regarding the period of hospitalization before operation. The group of patients that was in the hospital at least 72 hours before operation showed the lowest mortality rate.

We do not believe in delaying the operation after the patient has been adequately prepared.

In our cases, preoperative pulmonary complications increase the operative risk three times and cardiac complications double the risk. We also feel that liver insufficiency has not received the attention it merits, and for this reason believe that all patients should have a liver function test before being subjected to surgery.

The age of the patient, too, deserves some thought, for our records indicate that the mortality after operation rises with each succeeding decade.

The real problem in the management of acute cholecystitis comes in the handling of those patients in whom the complication of jaundice exists. Jaundice is now becoming more and more recognized as a symptom of hepatitis. Certainly the gravity of the condition is dependent upon the degree of liver involvement. All available laboratory means should be employed to rule out the cases of extrahepatic jaundice and of acute yellow atrophy. Having determined that the jaundice is obstructive, Courvoisier's law may be of value in deciding whether the blockage of the duct is due to stone or to new growth. The law states that in the presence of a palpable gallbladder the obstruction is likely not to be due to stone. But, of course, this rule has its exceptions. We have found in our experience that a repeated positive guaiac test upon the stool is the only constant sign of new growth. Operation should not be performed in the face of a rising icteric index, for even if obstruction is complete, or almost so, a constant level is eventually reached. These jaundiced patients, of course, should have investigation of the bleeding, clotting and prothrombin time and should receive vitamins D or K, bile salts, and blood transfusion, if the above tests at any time indicate a bleeding tendency.

Operative Procedures

Cholecystectomy was performed in 93 per cent of the cases and is the operation of choice. However, there are certain cases in which cholecystostomy, or one of its modifications such as the procedure of chemical cholecystectomy as practiced by Dr. Willis Gatch,[11] is a life-saving measure. Choledochostomy was performed in 6.6 per cent of the cases. It did not add to the operative mortality.

Summary and Conclusions

Clinical impression is of limited value in the recognition of chronic cholecystitis, for its diagnosis depends largely upon laboratory and technical methods of investigation. A plea is made for more complete study of all patients complaining of persistent indigestion.

Acute cholecystitis, on the other hand, is a condition in which a clinical diagnosis can be made with a high degree of accuracy (96 per cent of the cases reported). A plea is made for the greater utilization of the galactose liver function test in acute cases.

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THE FLEXIBLE GASTROSCOPE AS A DIAGNOSTIC AID*

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Any new instrument which enables us to see the interior of a viscus, without undue risk to the patient, merits very careful and serious consideration. This consideration should now be given to the new Wolf-Schindler flexible gastroscope which was perfected in 1932. Gastroscopy with the flexible scope has become a relatively simply procedure and is as practical as any other endoscopic examination.

Historical Data

In 1868 Kussmaul[1] was the first to pass metal tubes down the esophagus into the stomach in sword swallowers. He used an external source of light, because at that time there was no adequate way of lighting the interior of the stomach. (The Edison electric lamp was developed in 1879.) He soon decided that it was very dangerous and so of no practical value.

In 1881 Mikulicz[2] used a closed rigid tube with a lamp at the end. The objective of the optical system was just proximal to the light. He actually saw the pylorus in its sphincter movements and diagnosed carcinoma correctly. However, the procedure was too dangerous and he abandoned it.

From 1895 to 1910 several clinics in Germany, as well as Chevalier Jackson in this country, were improving instruments and observing the stomach through a rigid open tube. Foreign bodies were removed and biopsies were taken but only a small area of the stomach was visualized. The procedure was of limited value and was safe only in the hands of very few experts.

In 1923 Schindler[4] published a monograph on 400 gastroscopies, using a rigid gastroscope[5] which he himself constructed in 1922. But it was not until 1932 that Schindler[6] and Georg Wolf, a medical instrument maker in Berlin, perfected the

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present flexible gastroscope, by mounting a series of small lenses in a tube, at short enough intervals so that the image is not blurred when the tube ends. A clear image is maintained within thirty-four degrees of

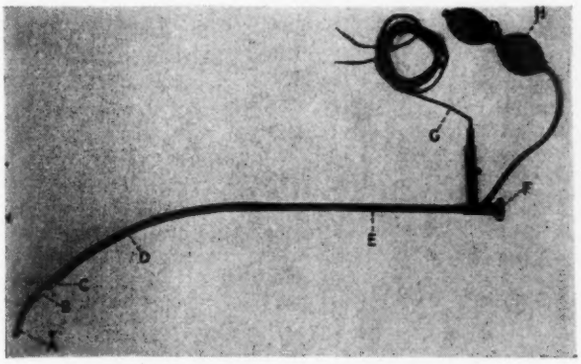

Fig. A. Wolf-Schindler flexible gastroscope: *(A)* rubber finger; *(B)* electric lamp; *(C)* objective; *(D)* flexible part; *(E)* rigid part; *(F)* ocular; *(G)* electric cable, and *(H)* air balloon.

flexion. Beyond that, there is poor visibility.

For the past six years we have had, therefore, a method for the internal examination of the stomach which compares with that for the urinary bladder. While the x-ray shows size, shape, position, capacity, motility, flexibility, gross filling defects and deep lesions, the gastroscope observes the mucous membrane and depicts inflammation, swelling, edema, hyperplasia, atrophy, erosions, hemorrhage, infiltration and pathological exudate. The two methods are therefore complementary one to the other, and in no way conflict.

Like the cystoscopist, the gastroscopist must make his diagnosis on visual interpretation, which involves considerable knowledge of gastric pathology, physiology, clinical interpretation, etc.

The Flexible Gastroscope

The flexible gastroscope is a closed tube 30 inches long. The proximal half of the metal tube is rigid. The distal part is cut in a long spiral, and completed by two rubber tubes, thus making the distal half flexible.

The scope has at its end, a solid, conical, rather firm elastic piece of rubber 4.6 cm. long. This so-called "rubber finger" bends as soon as it touches the surface of the stomach and leads the scope smoothly over the mucosa, thus preventing perforation of the stomach. Immediately back of the rubber finger is a small electric light, encased in a glass window. Next is the objective containing a prism. Then follows a series of 48 lenses which are supported in the flexible portion by a spiral steel spring wire.

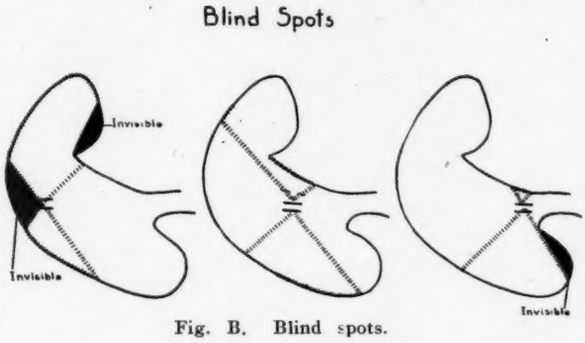

Fig. B. Blind spots.

There is an arrangement (by means of double walled tube) to pump air through the scope. This emerges into the stomach through three small perforations near the tip.

Examination

The patient reports for examination to the office or out-patient department on an empty stomach. A hypodermic of one-half grain of codeine sulphate and one one-hundredth grains of atropine sulphate is given to decrease the activity of the reflexes and the flow of saliva. The throat is swabbed with a solution of 2 per cent pontocaine to which is added one drop of adrenaline hydrochloride (1-1000 solution) to each c.c. of the pontocaine. The hypopharynx and the upper portion of the esophagus are then anesthetized with the same solution through a special anesthetising tube. The stomach is emptied by gravity method with an Ewald stomach tube. The patient lies on the left side, his head held by a nurse and the gastroscope is passed. The stomach is then inflated with air, illuminated, and examined. For further details in the technic of gastroscopy see Schindler.[7] After the examination the patient abstains from food for about an hour. He may return to work the same day.

One can see the entire interior of the stomach except for four blind spots (Fig. B).* Three small invisible areas are not important because lesions are rare in these

*Figure B shows only three blind areas.

The fourth blind area: The gastroscope lies against the posterior wall, and when the objective faces the mucosa, the distance is too short for visualization. Thus a small strip of the posterior wall theoretically cannot be seen.

areas. One cannot always see the lesser curvature of the prepylorus, the most important limitation.

One cannot see the esophagus, the duodenum, take a photograph or do a biopsy. Naturally one cannot determine the presence or absence of metastases.

Contraindications

The contraindications to gastroscopy are: aneurism of the aorta, obstruction of esophagus, obstruction of cardia, varices of the esophagus, cardiac decompensation, severe dyspnea, fever, recent history of swallowing corrosive poison, severe scoliosis and peritoneal irritation.

It may be stated, however, that whenever the Ewald stomach tube is passed with ease prior to gastroscopy (to empty the stomach) the gastroscope will also pass without difficulty.

Indications

Recent reports from many clinics are unanimous in proving the usefulness of the instrument in the following conditions:

(1) Differentiation between benign and malignant ulcer (Case 1).

(2) Suspicious gastritis (Cases 2, 6, and 7).

(3) Persistent abdominal distress following gastric surgery (Case 2).

(4) Unexplained: (a) abdominal distress, (b) gastro-intestinal hemorrhage, (c) loss of appetite, (d) loss of weight (Cases 2, 5 and 6).

(5) Question of both diagnosis and operability of carcinoma of stomach (Cases 3, 4 and 7).

(6) Control of positive and indefinite x-ray findings (Cases 5, 6 and 7).

The Normal Stomach

The normal mucosa of the stomach when viewed through the gastroscope is orange-red in color, glistening with highlights and appears soft, flexible and mobile.

The antrum with the pylorus relaxing and contracting is usually observed. The incisura angularis is seen as a parabolic curve (Figs. 1, 2 and 3).

The lesser curvature is nearly devoid of folds. The anterior wall presents a delicate network of folds (Fig. 4). The posterior wall and greater curvature exhibit thick parallel folds (Fig. 5).

Case Histories

The following cases have been selected, from a larger series of cases, to show the gastroscopic appearance of several of the more common pathologic conditions of the stomach; also how gastroscopy may at times aid in a more accurate diagnosis when its findings are correlated with clinical and roentgenological data.

Case 1.—Differentiation between benign and malignant ulcer (Fig. 6).

Mr. M. F., aged 57. History suggestive of ulcer began in 1937. X-ray examination in 1937 was negative for ulcer or malignancy. In January, 1939, pain in epigastrium became more marked and was not relieved by food or alkalies. Loss of appetite, weakness and loss of weight also started January, 1939. From January, 1939, to April, 1939, there was a loss of 17 pounds. The hemoglobin was 85 per cent and the red blood cells 3.8. There was no free acid in the gastric contents even on histamine stimulation.

X-ray January 28, 1939: "Gastric ulcer with crater of moderate size on the lesser curvature side in the pars media."

X-ray April, 1939: "Ulcer crater is smaller; progressive improvement. Nothing further can be said about the etiologic factor except that the progressive improvement under treatment would favor an inflammatory rather than neoplastic process."

An ulcer regime was instituted January, 1939. The symptoms disappeared and patient began to gain weight. However, symptoms recurred intermittently.

Because of the age of the patient, the sudden aggravation in symptoms, loss of appetite, loss of weight, the absence of free acid in the gastric contents and the presence of secondary anemia, carcinoma of the stomach was suspected, especially in view of the size of the lesion by x-ray.

Gastroscopic examination April 1, 1939: "Small white ulcerated area over angulus on lesser curvature. The border is sharply demarked and reddish giving the appearance of a benign healing ulcer" (Fig. 6).

X-ray June 9, 1939: "Some enlargement of the ulcer crater since the last study, although the crater is not quite as large as when first demonstrated in January of this year. The roentgen appearance is still that of a benign lesion with no definite evidence of malignancy, except for the failure to respond to treatment satisfactorily."

Follow-up September, 1939: Patient is symptom-free.

Summary of Case.—Ulcer crater in lesser curvature. Gastroscopy confirmed x-ray diagnosis of benign ulcer. Conservative treatment could be carried out with more assurance that it was not cancer.

Case 2.—Persistent distress following gastric surgery (Fig. 7).

Mr. A. T., aged fifty-two. History typical of ulcer began in 1915. A gastro-enterostomy was done in 1930. Ulcer symptoms recurred in 1931. However, since 1938 symptoms have not responded to either ambulatory or bed rest management. Severe epigastric pain, nausea, vomiting, belching, distention and loss of weight were marked.

X-ray March, 1937: "Deformed duodenal bulb. No jejunal ulcer."

X-ray April, 1937: "Deformed duodenal bulb. No jejunal ulcer."

X-ray April, 1938: "Deformed duodenal bulb. No jejunal ulcer."

X-ray April, 1939: "Duodenal ulcer and peptic ulcer at the stoma."

Because the patient did not respond, as previously, to the usual medical bed-rest-management for ulcer, gastritis was suspected as a complicating factor.

Gastroscopic examination May 5, 1939: "Ulcer at gastro-enterostomy stoma. The mucosa was dull, with diminished highlights, and appeared swollen, and sponge-like. It presented a velvety appearance. The changes in the mucosa were typical of hypertrophic gastritis" (Fig. 7).

Surgery, May 24, 1939: "The old gastro-enterostomy was undone. A Finney pyloroplasty was performed because of the presence of considerable scar tissue at the site of the old duodenal ulcer.

"The old scar tissue in the area of the stomach was biopsied. This showed 'catarrhal gastritis, chronic ulcer with scar tissue base and no malignancy. The duodenal mucosa also showed catarrhal inflammation with no malignancy.'"

Follow-up September, 1939. Patient is symptom-free.

Summary of Case.—Persistent distress following gastro-enterostomy for duodenal ulcer. X-ray showed only deformed duodenal bulb. Gastritis, suspected clinically, was demonstrated gastroscopically. The operative indication was then clear.

It is essential to determine the presence or absence of gastritis in the postoperative stomachs. Schindler[8] states that, in the presence of gastritis, "the best form of therapy is the undoing of the gastro-enterostomy if this is possible. It is surprising how quickly and how completely the most severe of these gastritides heal once the normal physiology of the stomach is restored."

Case 3.—Carcinoma of the greater curvature of stomach (Fig. 8).

Mr. J. M., aged forty-six. Epigastric pain after meals, belching, sour taste and occasional nausea began March, 1938. There was a loss of eight pounds from December, 1938, to March, 1939. Free acid was present in the gastric contents. The stools were negative for occult blood. Kahn negative.

X-ray January 11, 1939: "Rugæ in upper portion of stomach are large and irregular. There is a partial filling defect at the greater curvature border in the anterior-posterior view, not seen in oblique view. Findings: Gastritis. Re-examine at a later date."

Because of the presence by x-ray of an indefinite filling defect at the greater curvature of the stomach, carcinoma was naturally suspected.

Gastroscopic examination March 10, 1939: "There is an ulcerative carcinoma on the greater curvature of mid-portion of the stomach" (Fig. 8). "Proximally, there is sufficient normal mucosa to permit performing a gastric resection."

X-ray March 14, 1939: "A large irregularity was seen in the greater curvature portion of the stomach. However, there was some pliability of the walls which to some extent rules against malignancy. Examination was repeated on two occasions and the same findings were obtained."

Surgery: Gastric resection March, 1939.

Microscopic Diagnosis: "Undifferentiated small cell type carcinoma of the stomach."

Follow-up September, 1939: Patient is symptom-free.

Summary of Case.—Gastric carcinoma, greater curvature. Gastroscopy more accurate than x-ray. At the time of the operation, the site of the lesion presented only an indurated, stippled appearance of small extent on the serosa of the greater curvature. With the information gastroscopy had given, gastric resection was immediately done with more diagnostic certainty than if we did not have it.

Case 4.—Scirrhous carcinoma of antrum (Fig. 9).

Mr. M. E., aged seventy. Ulcer-like history began November, 1938. There was a loss of 12 pounds by March, 1939. The gastric contents showed no free acid. The stools showed 4 plus occult blood. The hemoglobin was 90 per cent and the red blood cells 4.58. The Kahn examination for syphilis was negative.

X-ray March, 1939: "Definite carcinoma in the distal third of the stomach. There is also a linitus affecting the proximal portion of the stomach."

Gastroscopy was performed to confirm the positive findings by x-ray.

Gastroscopic examination April 2, 1939: "There is an infiltrating non-ulcerative scirrhous carcinoma of the stomach involving the antrum" (Fig. 9). "Proximal to the antrum the stomach appears normal. Because of the patient's good physical condition, resection is advised in spite of his age."

Patient refused operation. He died suddenly August 5, 1939, following an injury.

Autopsy "showed stomach wall to appear normal except in lower portion, where it appears two to three times normal thickness. Cut section reveals hard white tumor mass involving large area of stomach."

Microscopic Diagnosis: "Linitis plastica. Diffuse scirrhous carcinoma of stomach wall."

Summary of Case.—Scirrhous carcinoma of antrum. X-ray, definite for carcinoma of distal third of stomach, also showed involvement of proximal portion. Gastroscopically proximal portion of stomach was not involved. Autopsy confirmed gastroscopic observation.

Case 5.—Benign tumor (Fig. 10).

Mr. M. S., aged fifty-six. Ulcer-like history began in 1926. He first reported for medical care December, 1936, when he suffered a hemorrhage (melena). He was hospitalized for three weeks, during which time he was under rigid Sippy management. There was no loss of weight since the onset of his illness. Free acid was present in the stomach contents. The Kahn examination for syphilis was negative.

X-ray January, 1937: "Filling defect of pars media of stomach, suspicious of malignancy."

X-ray February, 1937: "Abnormality in the com-

plete filling of the pars media of the stomach. Fluoroscopically, there was no definite filling defect or ulcer crater, but we believe there is sufficient variation from the normal to warrant a careful check-up examination with particular reference to this portion of the stomach in about a week."

Gastroscopic examination February 20, 1937, in coöperation with Dr. Rudolf Schindler: "Benign tumor, probably a myoma, of the lower part of the anterior wall between lesser and greater curvature" (Fig. 10).

Patient refused operation.

X-ray July, 1938: "Films of the barium-filled stomach show irregular filling of the stomach in the pars media. Comparison with the previous x-ray records shows this defect to be similar to that noted at the last study although it occupies a slightly lower position on the lesser curvature, which suggests that it is inflammatory in origin and has extended slightly. We believe neoplasm could not be ruled out, however."

Follow-up September, 1939: (over two and one-half years after gastroscopic diagnosis): Patient continues to have intermittent heart burn and vague epigastric distress which are relieved by frequent feedings and alkalies. There is no loss of weight. The gastric contents have free acid. The stools are negative for occult blood. Operation is refused.

Summary of Case.—Benign tumor. Gastroscopy diagnostic. X-ray could show only abnormality in filling at the site of the lesion.

Case 6.—Unexplained hemorrhages (Fig. 11).

Mr. P. Z., aged forty-eight. History suggestive of ulcer began in 1924. There were ten hemorrhages (melena) from 1931 to 1939. X-ray examinations on many occasions showed both pyloric and duodenal ulcers. The patient was hospitalized on many occasions for rigid Sippy management. Mucin, aluminum hydroxide, magnesium trisilicate, parenteral injections, etc., were given with little if any improvement.

Surgery, May, 1938, reports: "Stomach negative. There was moderate induration in the head of the pancreas, which could not be differentiated from a duodenal ulcer. Because of the absence of any remarkable evidence of duodenal ulcer it seemed advisable to do a jejunostomy in order to put the stomach at complete rest."

Since operation, patient has had the same distress and already has had two additional hemorrhages (melena).

Because of the patient's failure to respond to medical management and "the absence of any remarkable evidence of ulcer" at operation, it was thought necessary to rule out other pathologic changes by gastroscopic examination.

Gastroscopic examination August 11, 1939: "Reddening of the mucosa with considerable exudation typical of superficial gastritis" (Fig. 11).

Summary of Case.—Unexplained hemorrhages. Suspicious symptoms of ulcer. Negative surgical exploration. Jejunostomy without relief. Gastroscopy showed gastritis with marked exudation, sufficient to account for patient's symptoms.

Case 7.—Indefinite x-ray findings (Fig. 12).

Mr. I. T., aged fifty-seven. Epigastric fullness, belching, occasional nausea and vomiting and attacks of acute upper abdominal pain began December, 1938. There was a loss of 20 pounds by May, 1939.

X-ray May 4, 1939: "The gastric antrum appeared to be somewhat more rigid than usual, but at occasional intervals was traversed by unusually deeply cutting, quite powerful peristaltic contractions throughout its entire length. Impression: Chronic hypertrophic gastritis involving the gastric antrum. One might well consider gastroscopic confirmation of this opinion, particularly in order to rule out the presence of an early gastric neoplasm."

Gastroscopic examination May 12, 1939: "The mucosa of the antrum presented a dull, sponge-like, velvety appearance with diminished highlights. Impression: Hypertrophic gastritis involving the antrum. No malignancy" (Fig. 12).

X-ray September 5, 1939: "On re-examination of the stomach and duodenum, conditions were found essentially quite identical with those observed on May 4, 1939. It appears, therefore, that the opinion expressed in May is correct."

Follow-up September, 1939: Patient is symptom-free on a bland diet.

Summary of Case.—Gastritis suspected by x-ray and gastroscopy confirmed the diagnosis of gastritis. Neoplasm ruled out by gastroscopy.

Discussion

Summarizing the usefulness of gastroscopy:

1. *Gastritis.*—The most valuable contribution of gastroscopy, so far, has been in the field of gastritis. The symptoms are varied, conforming to no definite syndrome, and the diagnosis cannot as a rule be made from clinical and laboratory examinations. Only the mucous membrane is involved and there are no defects of the stomach wall, hence the x-ray cannot usually make the diagnosis. In the large group of patients who complain of gastro-intestinal symptoms and in whom physical, laboratory and x-ray examinations are negative, many, undoubtedly, would be found to have some form of gastritis when examined by the gastroscope. Chronic non-specific uncomplicated gastritis, according to Schindler,[9] is found in from 40 to 50 per cent of all patients examined with the gastroscope. Ten per cent of all massive gastro-intestinal hemorrhages are due to gastritis.

2. *Gastric Ulcer.* — Gastroscopy may give some very pertinent information, especially in finding small gastric lesions, in observing healing of gastric ulcers, and in differentiating between benign and malignant ulcerations.

The healing of ulcers can be observed very accurately. The gastroscopist can now see what the radiologist knew, namely that

Fig. 1. Normal Stomach: Antrum with pylorus completely relaxed. Angulus appears as a parabolic curve.

Fig. 2. Normal Stomach: Antrum with pylorus partially contracted.

Fig. 3. Normal Stomach: Antrum with pylorus completely contracted. Angulus and musculus sphincter antri (latter appearing as a twisted cord) divide antrum from body of stomach.

Fig. 4. Normal Stomach: Anterior wall with the delicate network of folds.

Fig. 5. Normal Stomach: The greater curvature (left) shows network of folds. The posterior wall (right) shows thick parallel folds.

Fig. 6. Benign ulcer over angulus (Case 1).

Fig. 7. Ulcer at gastro-enterostomy stoma. The elliptical opening is the stoma. The left upper area shows hypertrophic gastritis (Case 2).

Fig. 8. Ulcerative carcinoma of the greater curvature (Case 3).

Fig. 9. Scirrhous carcinoma of the anturm (Case 4).

Fig. 10. Benign tumor of the anterior wall (Case 5).

Fig. 11. Chronic superficial gastritis (Case 6).

Fig. 12. Chronic hypertrophic gastritis (Case 7).

the quick disappearance of a niche is due to the disappearance of edema and not to the complete healing of the ulcer. Though, complete healing may take place in from five to eight weeks, Palmer, Schindler and Templeton[3] reported cases (observed gastroscopically) in whom healing has not been complete at the end of one and two years.

By gastroscopy one may differentiate benign from malignant ulcers. This is possible because as one views the living stomach, "the blood is circulating, a fact which makes the edge and often the floor of the malignant ulcer differ distinctly from those of benign ulcer."[10] One can not always rely on the diminution in size of the ulcer crater by x-ray, since Schindler and Gold[10] have shown that during the course of treatment a niche may become smaller during roentgen-ray observation, even though the lesion is malignant.

3. *Carcinoma.*—Already several case reports have demonstrated that a small, localized, non-ulcerative carcinoma, the type notoriously hard to detect by x-ray, can be very well seen by an experienced gastroscopist. In a few instances the gastroscopic picture was more accurate (microscopic examination) than x-ray, surgeon's and pathologist's gross diagnosis. Schindler and Gold[10] explain it by "the high relief pattern and the brilliantly colorful appearance of the living tissue in the gastroscopic picture, due to the presence of circulating blood."

The scope can observe the degree of infiltration, secondary nodules, friability and extension of the upper edge of the lesion and hence may be more accurate in determining operability than any means we have heretofore possessed. This is extremely important information.

Peritoneoscopy can demonstrate metastatic spread in the liver, omentum, etc. With these two new diagnostic aids, one now should be able to eliminate many exploratory operations which turn out hopeless.

Summary

The diagnosis of many gastric lesions is not, any longer, complete without the aid which gastroscopy can give. The procedure is safe and simple, but the interpretation of the various pictures seen through the scope requires experience. The findings must always be correlated with clinical and radiologic data.

Gastritis can be diagnosed with certainty by the gastroscope; it can only be suspected by clinical or x-ray examination.

Gastroscopy is indicated where gastritis is suspected, where a differentiation between benign and malignant ulcer must be made, where the extent and operability of malignant tumors is in question, in all cases where x-ray is inconclusive, where there is unexplained abdominal distress, hemorrhage, loss of appetite, et cetera.

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CEREBRAL ANOXIA AND ANESTHESIA*

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Now, bodies of men and of animals generally, are nourished by three kinds of nourishment, and the names thereof are solid food, drink, and wind. Wind in the bodies is called breath, outside bodies it is called air. . . . So great is the need of wind for all bodies that while a man can be deprived of everything else, both food and drink, for two, three or more days, and live, yet if the wind passages into the body be cut off he will die in a brief part of a day, showing that the greatest need for a body is wind. Moreover, all other activities of a man are intermittent, for life is full of changes; but breathing is continuous for all mortal creatures, inspiration and expiration being alternate. . . . Now I hold that no constituent of the body in any one contributes more to intelligence than does blood. So long as the blood remains in its normal condition, intelligence too remains normal; but when the blood alters, the intelligence also changes. . . . So if all the blood experiences a thorough disturbance, the intelligence is thoroughly destroyed. For learnings and recognitions are matters of habit. . . . So in one place the blood stops, in another it passes sluggishly, in another more quickly. The progress of the blood through the body proving irregular, all kinds of irregularities occur.

So breaths are seen to be the most active agents during all diseases; all other things are but secondary and subordinate causes.

—HIPPOCRATES "On Airs."

The relationship of "breaths" and blood circulation to cerebral function remains the same today as it was in the time of our great medical preceptor. Today, more of the details of the mechanisms involved in this relationship are known to us, and this ancient knowledge will be discussed in the light of some recent additions to our knowledge of man-made breath disturbances resulting from a practical humanitarianism. It is almost one hundred years since C. W. Long and Horace Wells demonstrated the use of sulphuric ether and nitrous oxide as anesthetic agents in surgical operations. That the administration of anesthesia is not without its dangers, is attested by the accidents and deaths reported in the medical and dental literature throughout the period of its use. It is especially significant that the grave importance and responsibility of the anesthetist has been formally recognized by the creation of this society which I have the honor of addressing today. Whereas, formerly, the anesthetist was a simple helper to the surgeon, today he is the surgeon's indispensable co-worker who shares equally with him the heavy responsibility for the patient's safe journey into and from unconsciousness. The modern anesthetist shares this responsibility with the surgeon in much the same manner that the chief engineer shares the responsibility of an ocean liner with the captain of the ship. Both may have the same number of service stripes and the word of one is law in the engine room, while that of the other is law on the bridge. Each defers to the opinion of the other in matters relating to their respective domains. No longer, as in the old sailing days, is the captain supposed to be omnipotent and solely responsible. The ever increasing respect with which the anesthetist is regarded today arises from the dangers and difficulties which beset the practice of his profession and the recognition by his surgical colleagues of the fact that a highly specialized aptitude and knowledge are required to cope with these dangers.

The innovation of anesthesia produced a great problem for the anesthetist, that of anoxemia and its attendant devastating effects of cerebral anoxia. As Haldane stated, "Anoxemia not only stops the machine (the brain) but wrecks the machinery." The various mechanisms by which this delicate machinery is wrecked may be classified as *anoxic, anemic, stagnant* and *histotoxic* anoxia.

A simile used by Barcroft will be modified somewhat to illustrate the various types of anoxia resulting from anesthesia. Oxygen may be represented as milk, the red blood cells as servants, and the cerebral cells as the family at the table. In *anoxic anoxia* the supply of milk is either: too dilute to support life; or, inadequate to satisfy the inordinate appetite of the family. In *anemic anoxia* the servants are too few, or have their hands too full to carry milk to the family at the table. In *stagnant anoxia* the servants are too slow in carrying the milk to the table as needed. In *histotoxic anoxia* the family is too intoxicated to use the milk set before it.

In order to obtain safe, and at the same

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time adequate, anesthesia there must be rapid integration of various vital systems to meet the unusual and trying demands suddenly placed upon the individual. If any one system fails to change its rhythm to meet the emergency, disaster may result and, since every factor in the integration is altered to suit a changed environment, it is impossible to place the blame solely on any one factor. Similarly, when adjuvants such as pre-operative drugs are used; if the condition of the patient changes during operation, as from blood loss; or, if any one or more of many controllable or non-controllable integrations fail to occur, it is impossible to assign the fault to only one factor, should disaster result. For example, if a case of so-called "ether convulsions" is carefully analyzed, it will be found that there is usually a combination of factors responsible for the occurrence of cerebral anoxia with its clinical manifestation of convulsions. The increased oxygen demand in the patient with fever, or during hot weather; a low blood pressure; a low red cell count; depressing pre-operative medication; the asphyxia incident to nitrous oxide induction; these are all as important in the production of the dreaded clinical picture as the administration of ether itself. It would seem more fitting, therefore, to refer to "anoxic convulsions" rather than to "ether convulsions" in such cases.

Cases reported in the literature with the diagnosis of "liver death" would seem, on closer scrutiny, to be more properly classified as examples of cerebral anoxia. A combination of asphyxial factors is usually present—anoxic anoxia associated with anesthesia pushed to the point of obtaining upper abdominal relaxation, especially if nitrous oxide is used; catabolic anoxia from pre-operative fever; anemic anoxia secondary to hemolysis and diminished red blood cells; neurohumeral anoxia of jaundice or dehydration; and histotoxic anoxia from drugs which depress the respiratory centers.

The postoperative course in "liver death" is quite typical of the cerebral dysfunction observed with anoxia—hyperthermia, restlessness, increasing coma and death. Acute degenerative liver lesions are frequently found in fatal cases of cerebral anoxia. Since, however, the clinical picture in "liver death" is one of acute nervous tissue disintegration and is not peculiar to any one type of operation, it would seem more practical to describe these cases under the general heading "cerebral anoxia" with attention directed toward asphyxial factors rather than the liver or other anoxic organs.

The author has had occasion to observe several hundred individuals who exhibited evidence of disturbed cerebral architecture, probably as a result of an asphyxial episode associated with the administration of an anesthetic agent. Some of these patients had been given a general, spinal or local anesthetic for relief of pain during a surgical procedure. Others had been anesthetized through the placental circulation, the mother receiving anesthesia to abolish the pain of childbearing. Most of the cases in which severe neurological symptoms appeared following anesthesia were thought to fall into the anoxic anoxia group. In a few of these cases mechanical obstruction of the air passages played a part. One child, in whom the intraspinal portion of a mediastinal tumor was being removed, had convulsions on the table and died several hours later with the symptoms of generalized cerebral dysfunction characteristic of cerebral anoxia. The trachea had been constricted and displaced by the tumor and short periods of cyanosis were noted several times prior to the onset of convulsions. No doubt the intratracheal inhalation of the nitrous oxide-oxygen-ether mixture was interfered with, in this instance, by the mechanical obstruction to the trachea.

Cyanosis, which is a practical but rather uncertain indication of asphyxia, was present in many of the cases during operation. The absence of this safety guide accounts for the increased hazard of nitrous oxide induction in the negro. With certain conditions, one of which is the lowering of the pressure of CO_2 in the alveolar air after forced breathing, "there may be considerable oxygen want in the tissues (anoxia) though there is no anoxemia and the blood is almost as red as usual" (Haldane). Under these circumstances the absence of cyanosis may be most misleading in the proper estimation of cerebral oxygen requirement. Unless the anesthetist can recognize cerebral asphyxia in the absence of cyanosis and remedy the situation, the consequences may be grave. In the case of one white child who died with spasticity and convulsions four days after an elective ap-

pendectomy, there had been a discussion in the operating room regarding the cyanotic color of the patient, but it was decided that the color of the child under nitrous oxide-oxygen-ether anesthesia was due to the blue operating room lights rather than to actual cyanosis of the patient. Postmortem examination revealed the typical cerebral lesions associated with anoxia (Figs. 1 and 2).

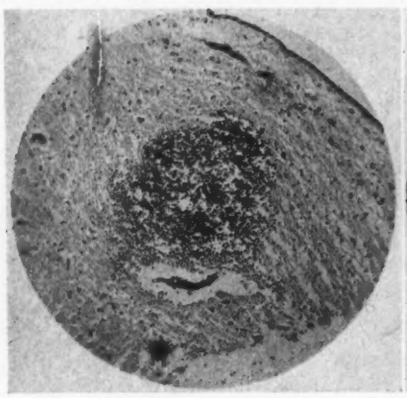

Fig. 1. Section of hippocampus with temporal horn (cresyl violet). Large subependymal bleedings were found, especially beneath the temporal horns of the ventricle. These bleedings are characterized by diapedesis, not by the rupture of vessel walls. Most of these hemorrhages have a perivascular arrangement, some being produced by a confluence of such bleedings. The subependymal glial cells show a definite hypertrophy with formation of protoplasmic processes in this region.

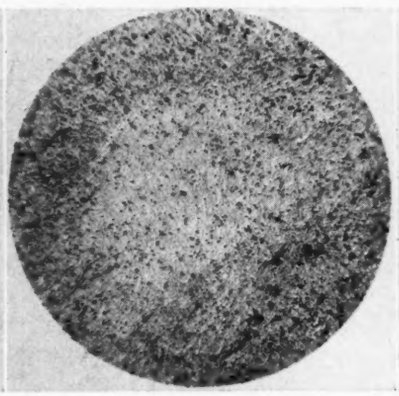

Fig. 2. Section of basal ganglia—putamen (H. & E.). A well circumscribed area is seen which takes a paler stain than its surroundings. In the center of this area there is a looser arrangement of the ground substance. In the more peripheral parts of this devastation area, there are numerous proliferated astrocytes with the production of glial fibrils. The nerve cells in the devastation area have entirely disappeared, while in the surrounding normal parts the remaining nerve cells are small. The glial hypertrophy indicates that the beginning of the degenerative process is of several days' duration.

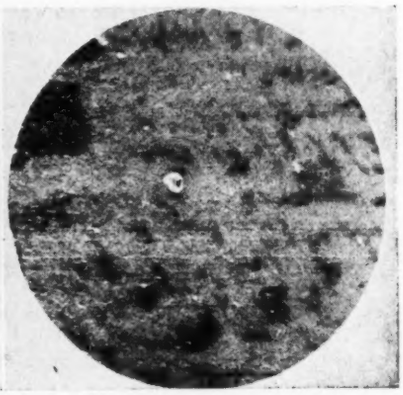

Fig. 3. Devastation areas in cerebral cortex of a patient who survived thirty days after asphyxia associated with nitrous oxide-oxygen anesthesia.

For the most part, the disasters in our series were suspected of being the result of an actual oxygen lack when the anesthesia was given. With a mixture containing 14 per cent oxygen and 86 per cent nitrous oxide, patients still wince when they are hurt. Even with this inadequate mixture, the patient has been placed in an atmosphere corresponding to an elevation of 12,000 feet, at which height definite signs of altered cerebral function are apparent under ordinary circumstances if the change is rapidly made. It is, then, quite evident that if such painful surgical procedures as the extraction of teeth, operations in the abdomen, or on the extremities, are to be carried out with an anesthetic mixture of nitrous oxide and oxygen, some other agent must be added, such as ether, chloroform, or asphyxia. A 10 per cent to 6 per cent oxygen pressure in the inspired air is equivalent to the atmosphere at an altitude of 24,000 to 35,000 feet, at which height a person is unconscious due to cerebral anoxia. It is, therefore, evident that asphyxia in itself is an effective, although not very safe, anesthetic agent in common use.

The following case has been selected as an example of the effects of anoxic anoxia associated with nitrous oxide-oxygen anesthesia:

A thirty-four-year-old woman, who had apparently been in good health, was advised by her dentist to have a lower molar extracted. No pre-operative drugs were given before anesthesia with nitrous oxide-oxygen was initiated but the patient struggled so under the early induction that the anesthesia was stopped and local injection advised. However, at the patient's request, nitrous oxide-oxygen anesthesia was again administered and the tooth extracted. When the mask was removed at the end of the procedure, the patient struggled wildly and lashed about. She remained stuporous and the physician called advised hospitalization. When admitted the patient was having spasm-like contractions of all extremities at intervals of three or four minutes. During these spasms the body was rigid, the eyes rolled upward and the thumbs were clenched in the fingers, the arms being rotated inward. She was noisy and screamed at intervals during the first day, but did not speak. Between spasms the eyes appeared to follow persons about the room although there appeared to be no intelligence, suggesting hysteria to several observers.

The generalized muscle spasms and ocular crises continued for six days, the patient making no sound after the first day. All extremities were spastic. Extensive studies of the blood, spinal fluid and urine were all negative. There was never any return of consciousness, although after six days the patient's condition changed, the extremities became flaccid, the spasmodic movements and ocular crises ceased. No deep or superficial reflexes were obtainable. Feeding was by nasal tube. The condition of the

patient remained stationary until death thirty days after the tooth extraction. A complete autopsy was done, which revealed nothing remarkable aside from the cerebral findings.

The author is greatly indebted to Dr. K. L. Scharenberg and Dr. N. Malamud, of the Laboratory of Neuropathology at the University of Michigan, and Dr. Louise Eisenhardt, Director of the Brain Tumor Registry of the Harvey Cushing Society, for their kindness in examining the tissues in this case.

Dr. Malamud's findings: Gross report.—The cortex, throughout the brain, appears atrophic with pronounced hyperemia and patchy areas of spongy and necrotic change. Two tumors were found within the brain substance: one, the size of a large walnut, was found in the right cerebellar hemisphere, circumscribed, solid in appearance, and of grayish color; a smaller one, the size of a lima bean, was found in the left cerebral hemisphere within the white matter of the parietal lobe. There was a suggestion of bilateral pyramidal tract degeneration in the medulla.

Histologic report.—The case presented two different pathological conditions: one of diffuse changes of the nervous tissue, probably related to the nitrous oxide anesthesia, revealed by degeneration of the parenchyma with diffuse loss of cells, pronounced sclerosis of those remaining and predominately affecting the upper layers (third layer of the cortex). The subcortical layers showed characteristic pronounced capillary hyperemia spreading in a laminar fashion. There was no outspoken glial reaction. The white matter showed swelling of the oligodendroglia and moderate hyperemia. The other condition was that of two metastatic tumors (previously described), which showed the characteristics of a spindle cell sarcoma with pronounced degeneration and of unknown origin. Diagnosis: Diffuse cortical degeneration (etiology nitrous oxide?) and several metastatic sarcomata of unknown origin.

Dr. Eisenhardt reported the areas of cortical degeneration as showing the microscopic picture typical of that described in cases of anoxemia, that is, a marked ischemic necrobiosis and extensive demyelinization (Fig. 3).

While the neuropathologist can report only what he sees under the microscope, it is most significant that in those cases in which death has been delayed a few hours or more following nitrous oxide asphyxia, there can be demonstrated a diffuse degeneration of brain tissue. The determination of the etiology of this brain change must be left to the clinician who observes these cases while still living and is familiar with all the circumstances of the individual case. Inasmuch as asphyxia of some degree was observed or could be implied in all fatal or damaged cases seen by the author or reported by others following nitrous oxide anesthesia, it seems reasonable that if the brain lesions are identical with those found with anoxia from any cause, the effect is due to the asphyxia rather than to a toxic agent.

The unexpected finding of two small neoplastic lesions in silent brain areas of the patient whose case has just been presented leads us to speculate on the rôle which they played. Autopsy revealed no primary neoplasm elsewhere in the body and the patient apparently was in very good health before the asphyxial episode. Did these unidentified neoplastic nodules set the stage for the anoxia which resulted when the nitrous oxide was given?

A catabolic type of anoxic anoxia also plays an important part in cerebral alterations associated with anesthesia. Although the oxygen supply may be normal, intrinsic or extrinsic factors may increase the demand of the tissues to the point where this demand cannot be fulfilled. In these cases, drugs which depress the respiratory mechanism are thought to inhibit the integration between increased oxygen demand and the available oxygen supply.

Such a situation was suggested in the following case:

A forty-eight-year-old housewife was seen following the removal of a toxic thyroid adenoma with avertin anesthesia. This patient had a severe hyperthyroidism, but with bed rest her basal metabolic rate was lowered to plus 27. She was given 90 mg. of avertin by rectum. Following operation the patient was extremely restless, did not respond and was dyspneic. Spasticity of all extremities was noted and generalized convulsions occurred eight hours after operation. The postoperative temperature, as in most of these cases of cerebral anoxia, was elevated for four days, going to 103.6° on one occasion. A left hemiparesis developed on the second day. On the fourth postoperative day the patient roused sufficiently to talk with her husband, although she was still very spastic. Convulsions and coma recurred and she died at the end of two weeks, markedly cyanotic even in an oxygen tent.

For every degree of fever there is a corresponding increase of at least 7 per cent in oxygen demand. Several of the cases under discussion were children with high temperatures at the time of operation who began having generalized convulsions immediately following operation or on the operating table during nitrous oxide-oxygen-ether or ether anesthesia. Here it is probable that the increased demand of the tissues for oxygen, due to the fever, could not be adequately met by a drug-depressed respiratory center laboring under a diminished oxygen intake.

Extrinsic causes of anoxic anoxia, such as unusually hot weather, take their anesthetic toll. The records of three mothers, who died with their newborn infants on one July day when the high temperature was 100°, showed that in each case the patient in labor had a normal temperature on ad-

mission to the hospital. With the effect of the administration of large doses of analgesic drugs superimposed upon the oxygen demand due to the unusual heat, the situation could not be met by the drug-depressed respiratory center and these patients all died with signs of acute cerebral disintegration and extreme terminal temperatures.

The anemic and stagnant types of anoxia are closely related, although their mechanisms differ. It is of utmost importance to keep up the blood volume during operative procedures in order to avoid anoxic brain changes. In the integration necessary for adaptation to lowered blood volume and anemia, as in cases of severe operative hemorrhage, the amount of oxygen supplied with the anesthetic must be increased to meet the changing conditions in the patient's internal environment or cerebral tissue will succumb. It is especially important to ascertain the number and state of the red blood cells and the blood pressure in patients to be operated on with rectal or intravenous agents, so that proper anesthetic integration is possible.

In one case a pre-operative red blood count of 2,000,000 had been overlooked in a patient who received a dose of 80 mg. of avertin. This patient never roused and expired the second postoperative day with symptoms of respiratory failure. It was suspected that there had not been enough oxygen carriers in the blood to keep the cerebral tissue alive when the physiologic function of the brain stem was inhibited by a comparatively light dose of avertin.

Another factor in anesthetic integration is the use of pleonectic substances such as sulfanilamide, which, in full dosage, may tie up one-third of the red cell oxygen carriers by fixing them with methemoglobin and thus produce a relative anemic anoxia.

A nine-year-old boy, seen because of coma, spasticity, convulsions and ataxia following mastoidectomy, showed definite signs of cerebral and cerebellar degenerative changes associated with anoxia until death on the tenth postoperative day. A full dose of sulfanilamide to the point of cyanosis had been given to this toxic child whose temperature was ranging around 103° for twenty-four hours preceding operation. In spite of what was thought to be an ample oxygen supply in the nitrous oxide-oxygen-ether mixture, the color of the blood remained dark throughout the operation. The child did not rouse and all extremities became rigid. Generalized convulsions began four hours after the anesthesia had been discontinued. After three days of unconsciousness, there was an apparent improvement for several days but the patient succumbed with a typical clinical picture of diffuse cerebral and cerebellar disintegration.

In considering the correlation of anemic and stagnant anoxia with anesthesia it is obvious from the cases used as illustrations that the surgeon and anesthetist must cooperate fully to combat anoxia. The advantages of any medication which produces a real or relative anemia must be carefully weighed against its disadvantages when anesthesia is contemplated.

The chief importance of *histotoxic anoxia* in relation to anesthesia lies in pre-operative drugging. The effect of a drug on cerebral tissues has a definite relationship to the amount of anesthetic agent which it is necessary to use. Excessive pre-operative medication may set the stage for cerebral anoxia because the respiratory and cardiac centers, depressed by drugs, cannot function properly to meet varying oxygen demands of cerebral tissue during anesthesia. For the surgeon to order a pre-operative drug regardless of what anesthetic is to be used is as logical as trying to fit a Ford body onto a General Motors chassis. Every pre-operative barbiturate or narcotic should be ordered with a thought as to its place in the whole anesthetic integration which is required. Fetal asphyxia induced by excessive maternal drug doses which depress the respiratory center, with superimposed inhalation anesthesia, may produce a child whose brain is badly and permanently damaged, mainly through the mechanism of histotoxic anoxia.

Any imbalance in the neurohumoral chemistry of cerebral cells must be taken into account if disaster is to be avoided when anesthesia is required in cases in which such imbalance exists. Dehydration, hypoglycemia or hyperglycemia, deficiencies in calcium, potassium, or phosphorus, can inhibit the ability of the cell to utilize oxygen and in this way initiate a destructive anoxia (Jowett and Quastel). The utmost vigilance must be exercised in weighing the added anoxic insult of oxygen deficient anesthetics and pre-operative drugs which depress brain stem function in the alcoholic or dehydrated patient, in the diabetic patient or, especially, the diabetic patient who has received insulin pre-operatively.

The author has been impressed by the number of cases in which cerebral degenerative changes date directly to the adminis-

tration of spinal anesthesia. The symptoms for which the patient was operated on may have disappeared and their place taken by an entirely new set of complaints relating to the brain. In five patients with cerebral changes following spinal anesthesia, seen recently by the author, large doses of pre-operative medication had been given in each instance.

A woman, aged thirty-six, was referred because of her complaints of persistent headache, nervousness, character change, insomnia and crying spells. She had been perfectly well until two years previously when she had a sudden abdominal pain. She was operated on under spinal anesthesia and an ovarian cyst removed. There was no recurrence of the abdominal pain. From this time on, however, she was a changed person. She began to worry continuously and, in spite of long rests in Florida, did not improve. She had frequent headaches and crying spells, was irritable and could not tolerate noise or alcohol. She had consulted many physicians because of her distressing symptoms without relief, the usual diagnosis being "anxiety neurosis" or "hysteria." Neurological examination was completely negative. A review of the circumstances surrounding the spinal anesthesia shows that at nine o'clock the morning of operation she was given nembutal, grs. 4½; at ten o'clock, morphine gr. ¼, and scopolamine gr. 1/100; she was then given 150 mgs. of novocaine intraspinally with satisfactory anesthesia for the removal of the ovarian cyst. There are no blood pressure readings recorded on the chart.

Inasmuch as there is frequently a decided drop in the blood pressure when spinal anesthesia is used, thus setting the stage for a stagnant anoxia, it follows that the addition of histotoxic agents in the form of excessive pre-operative medication may cause a cerebral oxygen lack of sufficient intensity to produce the cortical degeneration responsible for altered personality. In one arteriosclerotic man of fifty-eight years, who received morphine gr. ¼, hyoscine gr. 1/100, nembutal grs. 3, just before a spinal injection of 100 mg. novocaine for anal fistulectomy, a cerebral thrombosis with hemianopsia developed immediately after operation with progressive degenerative symptoms until death at the end of two weeks.

Another patient was seen who was hemiplegic, unconscious and in shock following prostatectomy, the anesthetic having been 60 mg. of intraspinal novocaine. Just previous to operation, morphine gr. ¼, and nembutal grs. 1½, were given. Systolic pressure, normally around 130, registered 90 shortly after the operation, which had been attended by considerable blood loss. The patient recovered, but with some neurologic sequelæ. Since thrombosis of cerebral vessels is a frequent finding in fatal cases of cerebral anoxia when neuropathologic studies are made, it would appear that the added histotoxic effects of pre-operative medication must be carefully considered in relation to the stagnant anoxia which frequently accompanies spinal anesthesia.

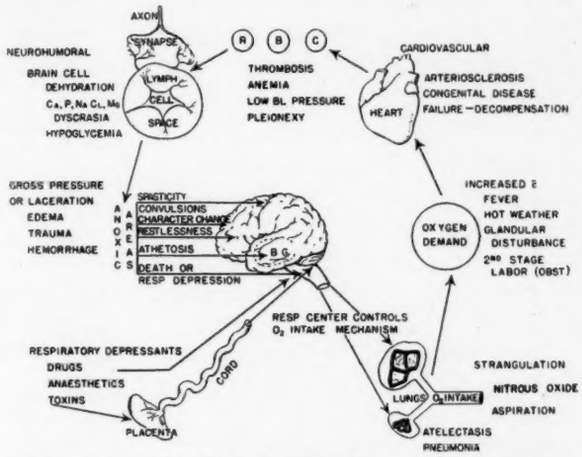

Fig. 4. A schematic representation of various anoxic factors which are important in anesthetic integration.

It is the impression of the author that degenerative changes in the cerebral cortex, which may follow anesthesia, are due to the *anoxia* produced by the drugs and anesthetic agents rather than to the agents themselves. It appears that in rare cases even local anesthesia may set up a histotoxic anoxia, leaving cerebral devastation in its wake.

In 1921, an eighteen-year-old girl had a tonsillectomy done following local injection of ½ per cent novocaine. Twenty minutes after operation she became extremely restless and vomited. Dyspnea and cyanosis rapidly developed and, in spite of oxygen administration, the patient remained markedly cyanotic and unconscious for six hours, after which she gradually improved. Since this asphyxial episode she has had an entire personality change which has persisted for seventeen years. Numerous sinus operations and several major abdominal procedures have failed to relieve the frontal headaches and atypical pains of which she complains. Her judgment is faulty and her conduct erratic. There is definite evidence of frontal lobe deterioration and this young woman is now under psychiatric observation in an institution.

Whatever the anesthetic agents which may play a part, there can be little doubt that asphyxia to the point of cerebral anoxia is a matter for serious consideration by those involved in the use of anesthesia.

Summary

The adaptation to and recovery from anesthesia require a complex integration of

the internal environment of the individual if cerebral anoxia, with its complication of death or permanent cerebral damage, is to be avoided. Cases of "ether convulsions" and "liver death" may more properly be classified as examples of cerebral anoxia. The precise rôle of anoxic, anemic, stagnant and histotoxic anoxia must be carefully considered in the execution of safe and satisfactory anesthesia (Fig. 4).

* * *

The coöperation of the Children's Fund of Michigan and of Dr. Nathaniel Gates and Dr. Gabriel Steiner in the preparation of this paper is gratefully acknowledged.

LUETIC POLYNEURITIS
A Case History

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Mrs. * *, a widow, aged fifty-two, noticed the first symptoms of her present illness about February 22, 1938. Her family history, as given at the time of her first consultation, and her own past history were negative. Her posture, while at work was faulty; for hours she used to sit on a hard chair with her legs crossed in such a way that her left leg was resting on her right knee. On or about February 22, 1938, she began to experience a pulling sensation in the posterior upper portion of her right hip. She did not consider her condition serious enough to warrant a physical examination, but availed herself instead of all the simple remedies suggested by her friends (among them were five medical men) who suggested various analgesics without giving her the benefit of a study of her case. Meanwhile her condition was steadily growing worse. By the end of April her entire right lower extremity felt numb and heavy with a sensation of pins and needles. She had to quit her work.

On the advice of her employer, she consulted an osteopath and remained under his care from April 30, 1938, to September 29, 1938, during which time she received 103 diathermy and infra-red treatments and massages; she had the right sciatic nerve stretched, without any improvement. Then, evidently under the impression that her gall bladder might be at fault, her physician made her eliminate from her diet at first fried food, fats, meats and then even starchy food. She was allowed fruit juices and certain fruits. Active catharsis to stimulate choleresis was resorted to (if there was any thiamin left in her system this treatment had deprived her of it). It is likely that the resulting athiaminosis aggravated her neuritis.

On September 29, 1938, I was consulted for the first time when she was found to be suffering from a well developed polyneuritis affecting her entire right lower extremity and extending upwards until it had involved almost two-thirds of her trunk. On the posterior aspect of her right hip at the junction of the upper two-thirds and lower one-third there was a very tender, painful spot. There seemed to be shortening of her right leg with a compensatory scoliosis. She was unable to stand erect; her body was bent forward. Her pupils reacted normally to light and accommodation. Urine findings were negative for albumin and sugar.

A diet rich in vitamin B was prescribed, to be taken along with her fruits and fruit juices, also brewers yeast tablets and capsules of vitamins A and D. In addition, a subcutaneous injection of 1,200 international units of thiamin chloride was administered. The only analgesics allowed her were hot, moist applications, and the use of a small infra-red lamp. The thiamin injections were continued during subsequent calls; the dose varied from 1,200 to 4,000 int. units; 1,500 units seemed to be the optimum dose. Slight transient reactions followed within a few hours after the thiamin injections whenever the doses were excessive.

Progress was steady though slow from the beginning of the treatment. Her pains and discomfort gradually lost some of their severity and soon she was able to assume a somewhat more erect posture and walk a little. This enabled her, hitherto bedridden, to come (in an automobile) to my office for her treatments and to receive three office treatments per week for the price of two house treatments.

About that time, there appeared in the *Journal of the American Medical Association* an abstract of an article calling attention to the synergistic action of thiamin chloride and acetylcholine hydrochloride. Being anxious to hasten the patient's recovery, I gave her on November 30, 1938, an injection of 1,800 int. units of thiamin and 10 minutes later an initial dose of 0.03 grams of acetylcholine chloride. The dose of the latter drug was increased gradually until a maximum of 0.1 gm. was reached. No severe reaction was encountered until December 4, 1938, when I gave her in *one* injection a mixture of 2,400 i.u. of thiamin chloride and 0.1 gm. of actylcholine hydrochloride. A violent reaction followed and the patient was very miserable up to December 6, 1938. I gave up the use of acetylcholine.

Then, in spite of the emphatically negative history she gave me, I had her blood tested and found out that her Kahn test was four plus. I advised her to take injections of neoarsphenamine and bismuth, in addition to the thiamin but she refused to take any of the arsenicals. The best I could do under such rather unusual circumstances was (1) to give her a series of intramuscular injections of iodobismitol and thiobismol, (2) to precribe Hg inunctions and potassium iodide drops, and (3) to keep up the thiamin and the hot applications.

By the middle of February, her pains had left her completely, her gait had improved and there were no tingling and no pulling sensations; and her numbness was gone. She got ready to go back to work, but this improvement was too good to last and she had a relapse, and a bad one at that, within a week; all the annoying symptoms of her disease came back. Repeated attempts to get her to con-

(Continued on page 1105)

A SURVEY OF THE IODIZED SALT OBTAINED, ON THE OPEN MARKET, FROM VARIOUS DISTRICTS OF THE STATE OF MICHIGAN, 1939*

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ANN ARBOR, MICHIGAN

After iodized salt was placed on the market,[5] advertising itself as containing between .01 and .02 per cent of sodium iodide or its equivalent, it was expected and hoped that systematic examinations of the product of the various manufacturing concerns would be carried out. However, no examining board of standardization was appointed. It was thought by some that those in charge of the application of the pure food law would automatically take this under consideration. The checking of the iodide content of the salt was desired alike by the Committee and the salt manufacturers.

The earliest check on the iodide content of iodized salt was made in the laboratories of one of the salt producers, the second by the Department of Agriculture, Bureau of Chemistry, Washington, and the third by the Director of Laboratories, Michigan Department of Health, Lansing.

First Survey (Michigan, 1926)

Results of the first survey were submitted to the Committee August 3, 1926. Ten different brands from the open market were analyzed. They are of considerable interest as they illustrate the prediction of the Committee[1,2] that there probably would be difficulty from a physical standpoint in bringing about a product of uniform iodide content, and that by accepting a minimum of .01 per cent and a maximum of .02 per cent there would be more likelihood of the content not going below .01 per cent, the amount originally recommended.

By reference to Table I, it will be seen that, with the exception of two manufacturers, all brands ran low in iodide content. In Brand F the content was found to be above .02 per cent in nine of the fifteen samples examined, and as high as .03 per cent in three samples. In Brand J the content varied quite consistently between .018 per cent and .02 per cent, the highest content being .023 per cent. However, one manufacturer's product (D) did not average .01 per cent. In the low groups (A, B, C, D, E, G, H, and I) there were more samples running .01 per cent and above than below that amount.

TABLE I. THE IODIDE CONTENT OF SIXTY-THREE SAMPLES OF IODIZED SALT REPRESENTING TEN DIFFERENT BRANDS

First Survey—Michigan, 1926
Results Figured as Sodium Iodide .02% being the Equivalent to .0222% Potassium Iodide

Manufacturer	% Sodium Iodide	Manufacturer	% Sodium Iodide
A	.008	G	.015
A	.010	G	.006
A	.012	G	.012
A	.012	G	.012
A	.013	G	.010
A	.014	G	.006
A	.010	G	.006
A	.010	G	.010
A	.010	G	.011
A	.010	G	.010
B	.012	H	.014
C	.008	I	.010
		I	.013
D	.008	I	.008
D	.006	I	.012
D	.008	I	.015
D	.012		
D	.012	J	.020
		J	.018
E	.008	J	.021
E	.008	J	.018
E	.018	J	.020
E	.010	J	.019
E	.012	J	.022
		J	.023
F	.028	J	.020
F	.030	J	.018
F	.018		
F	.024		
F	.024		
F	.018		
F	.030		
F	.029		
F	.022		
F	.030		
F	.018		
F	.026		
F	.018		
F	.018		
F	.016		

*Report No. 4 for the Iodized Salt Committee of the Pediatric Section of the Michigan State Medical Society. From the Department of Pediatrics and Infectious Diseases, University of Michigan Hospital. This is a report of the iodide content found compared with the iodide content claimed, together with an investigation of the distribution of iodide throughout the package and of the influences that might alter the iodide percentage of the salt.

The following table arranges the 63 samples according to the percentage of iodide found:

TABLE II. THE IODIDE CONTENT OF SIXTY-THREE SAMPLES OF IODIZED SALT ARRANGED ACCORDING TO THE AMOUNT OF IODIDE FOUND

First Survey—Michigan, 1926

Number of Samples Examined	Percentage of Iodide Found
4	.006
7	.008
10	.010
1	.011
9	.012
2	.013
2	.014
2	.015
1	.016
9	.018
1	.019
3	.020
1	.021
2	.022
1	.023
2	.024
1	.026
1	.028
1	.029
3	.030
63	

Second Survey (Washington, 1926)

The results of the second survey done at Washington were submitted to the Committee August 19, 1926. The analyses were accordingly made at practically the same time as those of Survey 1. Sixty-four samples, representing the products of eighteen manufacturers, were examined. The results are recorded in Table III. The figures in the last column represent the variation from the quantity of iodide declared on the label.

There were only eight samples in which sodium iodide was claimed to have been added. In one of these, no iodide was found; in the remaining seven, the iodide varied from .018 per cent to .05 per cent, an average of .031 per cent. Of the remaining fifty-six samples in the series, three were marked "Iodized," potassium iodide was found in two, the other contained no iodide. In four samples it was not clear from the label which iodide was used; but in the remaining forty-nine samples it is definitely recorded that potassium iodide was added. In these the iodide varied from

TABLE III. THE IODIDE CONTENT OF SIXTY-FOUR SAMPLES OF IODIZED SALT REPRESENTING EIGHTEEN DIFFERENT BRANDS

Second Survey—Washington, 1926

Manufacturer Number	Quantity of Iodide Declared on Label %	Quantity Iodide Found	Variation from Declared Quantity %
1	0.05 NaI.	0.05 NaI	0
1	"	.047	—6
1	"	.045	—10
2	.02 NaI.	.02	0
2	"	.02	0
2	"	.018	—10
3	"	.023	+15
4	.02 KI	.015 KI	—25
4	"	.009	—55
4	"	.008	—60
5	"	.028	+40
5	"	.029	+45
6	.022 KI	.016	—27
6	"	.014	—36
6	"	.013	—41
6	"	.018	—18
6	"	.027	—23
6	"	.026	+18
6	"	.011	—50
6	"	.013	—41
6	"	.019	—14
7	.023 KI	.016	—30
7	"	.017	—26
7	"	.017	—26
7	"	.012	—48
7	"	.011	—52
7	"	.011	—52
7	"	.022	—4
7	"	.024	+4
7	"	.020	—13
7	"	.015	—35
7	"	.015	—35
7	"	.014	—39
7	"	.0166	—28
7	"	.011	—52
7	"	.012	—48
7	"	.011	—52
8	.02 KI	.013	—35
8	"	.012	—40
8	"	.006	—70
8	"	.005	—75
9	.02	.012	—40
9	"	.013	—35
10	"	.011	—45
10	"	.016	—20
11	"	.048	+140
12	"	.011	—45
12	"	.010	—50
13	"	.0021	—90
14	.02 I (KI?)	.013	—35
14	"	.013	—35
14	"	.017	—15
14	"	.014	—30
15	.02 KI	.010	—50
15	"	.009	—55
16	"Iodized"	.000	—
16	"	.032 KI	—
16	"	.035	—
17	.02 NaI	.000	—
18	.023 KI	.017 KI	—26
18	"	.018	—22
18	"	.018	—22
18	"	.017	—26
18	"	.016	—30

.005 per cent to .048 per cent, average .0174 per cent; and in five it was below the originally required amount of .01 per cent. In Table IV the samples are arranged according to the amount of iodide found.

TABLE IV. THE IODIDE CONTENT OF SIXTY-FOUR SAMPLES OF IODIZED SALT ARRANGED ACCORDING TO THE AMOUNT OF IODIDE FOUND

Second Survey—Washington, 1926

Number of Samples Examined	Percentage of Iodide Found
2	.000
1	.0021
1	.005
1	.006
1	.008
2	.009
2	.010
7	.011
4	.012
6	.013
3	.014
3	.015
4	.016
1	.0166
5	.017
4	.018
1	.019
3	.020
1	.022
1	.023
1	.024
1	.026
1	.027
1	.028
1	.029
1	.032
1	.035
1	.045
1	.047
1	.048
1	.050

In one plant where a careful laboratory control of their salt was maintained, data were submitted to the Department of Agriculture, Washington, showing an average variation of 10 per cent from the declared quantity of iodide, in twenty samples collected over a period of three weeks. The maximum variation from the declared amount was 22 per cent.

Third Survey (Madison, Wis., 1929)

Dr. M. Starr Nichols,[4] using the Kelly and Husband method, examined fourteen packages of iodized salt for their iodide content. These packages were known to have been standing for nine months. His figures are presented in Table V. The third column is arranged to correspond with the other tables in this report.

TABLE V. THE IODIDE CONTENT OF FOURTEEN SAMPLES OF IODIZED SALT

Sample	Amount of Sodium or Potassium Iodide Claimed %	Amount Found After 9 Months %	Variation From Declared Quantity %
A	0.05	0.034	—32
B	0.02	0.017	—15
C	0.02	0.013	—35
D	0.02	0.026	—
E	0.023	0.0105	—54
F	0.02	0.008	—60
G	0.02	0.011	—45
EE*	0.023	0.015	—35
H	0.0222	0.017	—23
EEE	0.023	0.018	—22
AA	0.05	0.042	—8
FF	0.02	0.029	—
EEEE	0.023	0.008	—65
K	0.02	0.0012	—94

*Samples with more than one letter indicate same brand purchased at different localities.

Fourth Survey (Michigan, 1929)

William C. Geagley[3] reports the analyses of nineteen packages of iodized salt from the Department of Agriculture, Lansing, Michigan, from which the following table is constructed.

TABLE VI. THE IODIDE CONTENT OF NINETEEN SAMPLES OF IODIZED SALT

Sample	Iodide Claimed %	Iodide Found %	Variation From Declared Quantity %
A-59	.02	.002	—.018
J-420	.02	.019	—.001
V-641	.02	.02	—
Y-81	.02	.007	—.013
H-1	.02	.005	—.015
A-58	.02	.014	—.006
V-643	.02	.017	—.003
J-422	.02	.0026	—.0174
A-55	.02	.019	—.001
V-642	.02	.01	—.01
J-419	.02	.0153	—.0047
Y-79	.02	.0152	—.0048
A-60	.02	.018	—.002
J-418	.02	.018	—.002
V-652	.02	.021	+.001
A-56	.023	.018	—.005
Y-78	.02	.0133	—.0067
J-421	.023	.016	—.007
V-660	.02	.0184	—.0016

Fifth Survey (Michigan, 1936)

The results of the fifth survey were submitted to the Committee by C. C. Young, D.P.H., Director of Laboratories, Michigan Department of Health,[3] January 6, 1936.

The samples of salt on which analyses are reported were collected by the field inspectors of the Michigan Department of Agriculture, Food and Drug Division, as official samples. Twelve different brands were examined. All of these salts contained some iodide but the content varied greatly from that claimed on the label. This variation, they thought, may have been due to inaccuracy in manufacture (mixing) or to loss of iodide in storage and transportation. The results are recorded in Table VII.

TABLE VII. THE IODIDE CONTENT OF TWELVE SAMPLES OF IODIZED SALT REPRESENTING TWELVE DIFFERENT BRANDS

Fifth Survey—Michigan, 1936

Manufacturer	Labeled Percentage of Potassium Iodide	Percentage of Potassium Iodide Found	Variation from Declared Quantity %
1	.023	.0176	—.0054
1	.023	.0211	—.0029
2	.02	.0180	—.0020
3	.02	.0070	—.0130
4	.02 about	.0232	—.0032
5	.023 about	.0096	—.0134
6	.023	.0164	—.0066
7	.023	.0133	—.0097
8	.02	.0090	—.0110
9	.02	.0116	—.0084
10	.02	.0236	+.0036
11	.023	.0152	—.0078
12	.020	.0147	—.0053

It is seen that all but one sample contained less iodide than claimed; but only three were below .010 per cent, the amount originally proposed by the Iodized Salt Committee; a better showing than either of the first two surveys.

Sixth Survey (Michigan, 1938)

The sixth survey, or series of "Iodized Salt" analyses, done by the authors on forty-seven samples obtained from various locations representing the entire State of Michigan are recorded in Tables VIII and IX. In addition to securing these data we attempted to determine the effect of ageing, agitation and centrifugation on the distribution of iodide in the salt (Tables X, XI and XII). We have also investigated the possible effect of the addition of so-called drying substances on the percentage of iodide in the package (Table XIII) and whether any iodide is absorbed by the container (Table XIV).

Method*

Reagents

Standard Potassium Iodide Solution—0.1 mg. per c.c.

Chloroform—U.S.P., colorless, and water-clear. It is advisable to filter this reagent before use.

Sulfuric acid—10 per cent by volume.

Hydrogen peroxide, U.S.P. (3 per cent).

Determination

Dissolve in water in a liter flask, 300 grams of the mixed sample, make to mark, and mix. Pipet aliquots containing 0.1-0.3 mg. of KI into Nessler tubes and add 5 c.c. of water. Measure accurately into respective Nessler tubes 1.0-3.0 c.c. of the Standard KI solution, differing by 0.2 c.c. from each other, enough water to make with the standard a total volume of approximately 5 c.c., and a non-iodized salt solution adjusted to the same strength and volume as the unknown aliquot taken. Add from a buret to both standards and aliquots, exactly 5 c.c. of chloroform. Add 4 drops of the sulfuric acid from a 1 c.c. graduated pipet. To each tube in turn add 5 c.c. of hydrogen peroxide and at once mix the liquids thoroughly for several minutes with a bent glass rod. Let stand until the colored chloroform has separated to the bottom of the tubes. Break up the small amount of chloroform that usually floats on top of the aqueous solution. Compare the colors developed in the aliquots and standards by viewing sidewise through the tubes against a white background and calculate the percentage of KI.

If we arbitrarily consider .018 per cent to .024 per cent as a legitimate variation in the iodide content of the salt, we find that seventeen, or 36.2 per cent, of the samples were deficient in iodide. Three showed an excess, .026 per cent, .035 per cent and .050 per cent respectively; twenty-seven, or 57.4 per cent, were within the range. It is of interest to note that there were no samples containing less than .010 per cent, the amount the Committee originally recommended as sufficient to prevent the development of endemic goiter.

The Effect of Aging or Time of Standing.—Twelve of the samples were thoroughly mixed and locked in a cupboard in a dry room for a period of six months or over; when they were, after thoroughly mixing, again analyzed for their iodide content. There was only a very slight decrease in the amount of iodide. This difference was practically within the percentage of error of the method (Table X). This is

*Based on method used at one of the stations of the U. S. Food and Drug Administrations.[3]

TABLE VIII. THE IODIDE CONTENT OF FORTY-SEVEN SAMPLES OF IODIZED SALT REPRESENTING THIRTY-ONE DIFFERENT BRANDS

Sixth Survey—Michigan, 1938-9

Sample No.	Manufacturer	Brand	Carton	Amount of Iodide		Dryer	Location
				Claimed	Found		
2	A	1	Round	.023	.016	$MgCO_3$	Flint
9	A	1	Round	.023	.020	$MgCO_3$	Detroit
33	A	1	Round	.023	.020	$MgCO_3$	Jackson
28	A	2	Oblong	.023	.012	$MgCO_3$	Grand Rapids
11	B	3	Round	.020	.020	Ca_3PO_4	Detroit
13	B	3	Round	.020	.022	Ca_3PO_4	Detroit
5	B	3	Round	.020	.021	Ca_3PO_4	Oscoda
23	B	3	Round	.020	.019	Ca_3PO_4	Grand Rapids
48	B	3	Round	.020	.020	Ca_3PO_4	Ann Arbor
19	B	4	Round	.020	.022	$Ca_3PO_4+NaHCO_3$	Ann Arbor
29	B	5	Oblong	.020	.020	$Ca_3PO_4+NaHCO_3$	Ann Arbor
15	C	6	Round	.023	.020	$MgCO_3$	Manchester
38	C	6	Round	.023	.018	$MgCO_3$	Marquette
20	C	6	Round	.023	.020	$MgCO_3$	Grand Rapids
6	C	6	Round	.023	.019	$MgCO_3$	Flint
30	C	6	Round	.023	.016	$MgCO_3$	Newberry
34	C	6	Round	.023	.023	$MgCO_3$	Jackson
32	D	7	Round	.020	.010	$MgCO_3$	Newberry
10	?	8	Round	.023	.050	$CaCO_3+NaHCO_3$	Detroit
12	?	9	Round	.023	.020	$MgCO_3$	Detroit
26	?	9	Round	.023	.022	$MgCO_3$	Grand Rapids
14	?	10	Round	.023	.021	Ca_3PO_4	Detroit
17	?	11	Round	.023	.035	Ca_3PO_4	Manchester
18	?	12	Round	.020	.015	$MgCO_3$	Flint
21	?	13	Round	.020	.021	$MgCO_3$	Grand Rapids
22	?	14	Round	.020	.016	$MgCO_3$	Grand Rapids
24	?	15	Round	.020	.024	$NaHCO_3+Ca_3(PO_4)_2$	Grand Rapids
25	?	15	Round	.020	.019	$NaHCO_3+Ca_3(PO_4)_2$	Grand Rapids
27	?	16	Oblong	.023	.026	$MgCO_3$	Grand Rapids
31	?	17	Round	.023	.020	$MgCO_3$	Newberry
35	?	18	Round	.020	.015	$Ca_3PO_4+NaHCO_3$	Jackson
1	E	19	Round	.023	.021	$MgCO_3$	Flint
8	E	10	Oblong	.023	.013	Ca_3PO_4	Flint
3	?	9	Round	.023	.020	$MgCO_3$	Fenton
4	?	11	Round	.023	.018	Ca_3PO_4	Fenton
7	F	20	Oblong	.023	.020	$MgCO_3$	Flint
36	?	21	Round	.023	.011	$MgCO_3$	Marquette
37	?	22	Round	.023	.012	$MgCO_3$	Marquette
39	?	23	Round	.023	.013	$MgCO_3$	Marquette
40	?	24	Round	.023	.013	$MgCO_3$	Marquette
41	?	25	Round	.020	.014	$Ca_3(PO_4)_2+NaHCO_3$	Marquette
42	?	26	Oblong	.023	.016	$MgCO_3$	Marquette
43	?	27	Round	.023	.010	$MgCO_3$	Ann Arbor
44	?	28	Round	.023	.020	$Ca_3(PO_4)_2$	Ann Arbor
45	?	29	Round	.023	.023	$Ca_3(PO_4)_2$	Ann Arbor
46	?	30	Round	.023	.018	$Ca_3(PO_4)_2$	Ann Arbor
47	?	31	Round	.023	.012	$MgCO_3$	Ann Arbor

at variance with the survey of Nichols,[4] who reported a loss of iodide content of from 6 to 95 per cent during a period of twenty-four months.

The Effect of Centrifugation.—Two 80-gram samples were taken from each of two packages of well-mixed iodized salt. After determining the iodide content of each, they were subjected to centrifugation at 4,000 R.P.M. in an angle centrifuge for two hours. The top and bottom thirds were carefully separated and their iodide content determined. It will be seen by reference to Table XI that no change was effected by the centrifugation. The samples were weighed before and after centrifugation to determine the water loss; it varied from zero to 0.7 per cent, which would not be sufficient to alter the iodide value.

The Distribution of Iodide in the Package

It is of interest to know how the iodide is distributed throughout the package. Ac-

cordingly, eight packages that had stood on the shelf three months were investigated. The upper third of the package was carefully scooped off, thoroughly mixed and its iodide content determined. The same procedure was carried out with the middle and the bottom thirds. It will be seen from Table XII that the bottom third contains definitely less iodide than the other two-thirds. After prolonged agitation the decrease in the content of iodide in the lower third is more marked.

TABLE IX. THE IODIDE CONTENT OF FORTY-SEVEN SAMPLES IODIZED SALT ARRANGED ACCORDING TO THE AMOUNT OF IODIDE FOUND

Sixth Survey—Michigan, 1938-9

Percentage	Number
.010	2
.011	2
.012	3
.013	3
.014	1
.015	2
.016	4
.018	4
.019	3
.020	10
.021	4
.022	3
.023	2
.024	1
.026	1
.035	1
.050	1
Average: .01883	Total: 47 samples

TABLE X.

Package Number	Control Analyses Iodide %	After Standing Six Months	
		First Analysis Iodide %	Second Analysis Iodide %
9	.020	.017	.017
10	.050	.046	.042
11	.020	.017	.017
14	.021	.020	.018
17	.035	.030	
19	.022	.019	.019
27	.026	.026	.026
29	.020	.017	.016
41	.014	.016	.016
42	.016	.016	.016
44	.020	.018	.017
47	.012	.011	.012

TABLE XI. EFFECT OF CENTRIFUGATION ON THE DISTRIBUTION OF IODIDE IN IODIZED SALT

Package Number	Iodide Before Centrifugation	Iodide After Centrifugation		Loss in Weight
		Top	Bottom	
38 a	.016%	.016%	.016%	.2 gm.
b	"	.016%	.016%	.0
48 a	.020%	.020%	.020%	.25
b	"	.020%	.020%	.60

(a) (b): Two samples from each package were run as a check.

TABLE XII. DISTRIBUTION OF IODIDE IN THE VARIOUS LEVELS OF EIGHT PACKAGES OF IODIZED SALT AND THE EFFECT OF STANDING AND AGITATION

Number	Company	Brand	Iodide Claimed	Iodide Content After Standing 3 Months				Iodide Content After 1,000 Miles Auto Travel Over Rough Roads			
				Top	Middle	Bottom	Average	Top	Middle	Bottom	Average
1	E	19	.023	.022 .022	.022 .022	.018 .018	.021 .021	.021	.018	.016	.018
8	E	19	.023	.014	.013	.012	.013	.016	.019	.012	.016
2	A	1	.023	.016 .016	.015 .016	.015 .015	.015 .016	.017	.018	.015	.017
3	?	9	.023	.021 .021	.021 .021	.018 .018	.020 .020	.023	.020	.018	.020
4	?	11	.023	.018 .018	.018 .018	.018 .018	.018 .018	.018	.016	.014	.016
5	B	3	.020	.021	.021	.021	.021	.020	.018	.018	.019
6	C	6	.023	.020	.019	.019	.019	.025	.023	.019	.023
7	F	20	.023	.020	.022	.018	.020	.014	.013	.012	.013
		Average		.01887	.019	.01737		.01925	.01812	.01550	

The Iodide Content of Iodized Salt Containing Various Drying Substances

Forty-five packages of iodized salt in our series had a desiccant added to them, either magnesium carbonate, calcium phosphate, calcium phosphate with sodium bicarbonate, or calcium carbonate with sodium bicarbonate. By reference to Table XIII it will be seen that those packages to which magnesium carbonate was added contain the lowest amount of iodide. However, we think one would not be justified in saying that the magnesium carbonate is responsible for this.

Observations on the Carton

We became interested to know if the iodide penetrated into the pasteboard of the carton and if this might account for loss of iodide. The labels, metal spout and all traces of salt were removed from six packages. The packages were individually torn into small pieces approximately one inch square and placed in liter extraction bottles. Approximately 600 c.c. of distilled water was added to each, thoroughly shaken and allowed to extract for twenty-four hours, then filtered and the pulp squeezed to remove practically all of the water. This thoroughly mixed extract was analyzed for its iodide content by the method heretofore described. It will be seen in Table XIV that comparatively large amounts of iodide were contained in the pasteboard in all but one of the cartons; as much as 69 milligrams in one instance—but still not enough to account for the loss of iodide from the salt in two of the six packages (42, 47). In one package subject to the same previous conditions no iodide was found in the carton.

TABLE XIII. THE POSSIBLE EFFECT OF ADDING A DESSICANT TO IODIZED SALT ON ITS IODIDE CONTENT

Claimed Amount of Iodide with $MgCO_3$		Claimed Amount of Iodide with $Ca_3(PO_4)_2$		Claimed Amount of Iodide with $Ca(PO_4)_2 + NaHCO_3$	
Claimed .023%	.020%	Claimed .023%	.020%	Claimed .023%	.020%
Found		Found		Found	
.026*	.021	.023	.022	.035	.024
.023	.015	.021	.021		.022
.022	.010	.020	.020		.020
.021	.010	.018	.019		.020*
.020		.018			.019
.020		.013*			.015
.020					.014
.020					
.020					
.019					
.018					
.018					
.016*					
.016					
.016					
.013					
.013					
.012					
.012					
.012*					
.011					
.010					
Average:					
.0173	.0140	.0188	.0205		.0191

*Oblong package.

Summary and Conclusions

1. Since the introduction of iodized salt in Michigan,[5] six surveys of the iodide content have been made of packages obtained on the open market. These are recorded.

2. A tendency for the iodide found to be below the amount claimed on the label of the package is shown. The amount found was seldom below the amount the Iodized Salt Committee had determined to be sufficient to prevent endemic goiter in children.

TABLE XIV. IODIDE IN THE PASTEBOARD OF THE IODIZED SALT CARTON

No.	Amount of Iodide Claimed in the Salt %	Amount of Iodide Found in the Salt %	Total Amount of Iodide Claimed mg.	Total Amount of Iodide Found mg.	Amount of Iodide Found in the Carton mg.	Difference mg.
9	.023	.020	169	147	18 (10.9%)	—4
15	.023	.020	169	147	28 (16.0%)	+8
26	.023	.022	169	161	0	—8
42	.023	.016	312	217	66 (23.3%)	—29
47	.023	.012	169	88	30 (25.4%)	—51
48	ca .023	.020	ca 147	147	69 (31.9%)	+69

3. In the authors' survey, if we arbitrarily consider .018 per cent to .024 per cent iodide to be a legitimate variation in the iodide content of iodized salt, seventeen (or 36.2 per cent) of the samples examined were deficient in iodide; three (or 6.4 per cent) showed an excess, and twenty-seven (or 57.4 per cent) were within the range. No samples contained less than .010 per cent of iodide, the amount originally recommended by the Iodized Salt Committee as sufficient to prevent the development of endemic goiter.

4. Ageing—allowing the packages to stand on the shelf for six months—caused no appreciable loss of iodide.

5. The bottom third of a package of iodized salt contains less iodide than the upper two-thirds after it has stood three months. The decrease in iodide content in the lower third is more marked after prolonged agitation of the package.

6. Centrifugation at 4,000 R.P.M. in an angle centrifuge did not cause any change in the per cent of iodide in the top or bottom portion of the tubes.

7. Those samples of iodized salt which contained only magnesium carbonate as the desiccant showed the lowest amount of iodide. We are not justified in saying that magnesium carbonate is responsible for this situation.

8. The carton material of iodized salt packages may absorb large amounts of iodide. Five of six packages examined showed iodide; some in sufficient amount to account for the deficiency in the salt.

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CLINICAL USES OF ENDOMETRIAL BIOPSY*

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This report includes the results of 352 endometrial biopsies taken from 114 different patients. These patients represented a variety of clinical conditions, including: (1) decreased menstruation, twenty-nine patients; (2) uterine bleeding, twenty-two patients; (3) sterility, fourteen patients; (4) normal postpartum, twenty-one patients and (5) controls, twenty-eight patients.

The diagnosis and treatment of functional pelvic disorders has been handicapped by the lack of an accurate practical test to tell what degree and type of ovarian failure is present. Endocrine assays of blood and urine are of proven value in the research laboratory but too expensive and complicated for practical use. Examination of vaginal smears has the objection of being relatively insensitive compared to endometrial biopsy. Vaginal smears give information about the theelin level alone, telling nothing about the presence or absence of ovulation. A complete history and physical examination is the most important step in the diagnosis of either an organic or a functional disorder. The diagnosis in functional pelvic disorders may be advanced still further by the use of endometrial biopsy, which, in a practical way, reflects the endocrine status of the ovaries. The Novak[9] curette was used to secure specimens of endometrium from high on the anterior or posterior walls of the uterus. It would seem to us that this method is superior to that of Wollner,[20] who believes that tissue from the endocervix offers a better picture. It would appear better to remove the specimen from an area where regeneration is continually taking place rather than from the cervix, where subsequent scar formation might cause a severe contraction. No

*From the Departments of Gynecology and Pathology, Butterworth Hospital. Presented before the Section on Obstetrics and Gynecology, Michigan State Medical Society, Grand Rapids, September 20, 1939.

dilatation was necessary beyond the preliminary passage of a uterine sound. The tissue was placed in formalin solution and sent to the laboratory to be sectioned and stained. The chief contraindications to endometrial biopsy are pregnancy and pyometria.

Endometrial biopsy, like other diagnostic procedures, has certain limitations, but we agree with Herrell[5] that it has proved to be the greatest single aid in determining whether ovarian activity is normal or deficient. In 1896, Westphalen[18] described the cyclic changes in endometrium. His work was corroborated and amplified by Hitschman and Adler[7] and later by Schroeder.[15] In 1915, Novak[10] published his first article on this subject, which was followed by his monograph in 1921.[11] In these studies, the endometrial cycle was divided into four phases: (1) the postmenstrual, (2) the proliferative or interval, (3) the secretory, premenstrual or differentiative, and (4) the menstrual. Later Sturgis and Meigs[17] studied the changes in two phases: the preovulatory or proliferative phase and the postovulatory or secretory phase, the latter culminating in menstruation provided pregnancy had not taken place. Because there can be no secretion in the glands unless the endometrium fully differentiates itself, Herrell and Broders[4] were correct in substituting "differentiative" phase for secretory phase, but we believe this is largely a matter of terminology. From our study of the endometrial biopsies obtained from the patients encountered in the practice of one of us (L. S. G.) it would appear more practical to follow the example of Sturgis and Meigs and divide the cycle into the preovulatory and postovulatory phases, designating whether the specimen showed early or late changes. It should be emphasized that the two phases are sharply demarcated so that no confusion should result except in occasional instances when the specimen is taken on the day of ovulation. If this occurs it is of no disadvantage when the routine procedure is to take four specimens at weekly intervals. It should be clearly understood that the changes taking place in the endometrium are merely reflections of different phases of ovarian activity. Facilities have not been available for the estimation of the hormone content of the blood.

Normal Functioning of the Ovary

At the cessation of menstruation the endometrial acini are short tubular structures, few in number, and many of them open directly on the ragged and irregular surface epithelium. The stroma is compact and stains deeply, while the blood vessels are small and exist as mere capillaries. The lining epithelium of the acini consists of columnar cells which are irregularly placed in relation to the basement membrane and show no mitotic activity. At this time the ovarian follicle shows a piling up of granulosa cells over the ovum in the formation known as the cumulus oöphorus and the corpus luteum of the preceding ovulation is rapidly regressing. If the follicular cells were the only source of theelin the postmenstrual concentration would be nil, but Parks[12] has shown that it can be extracted from the ovarian stroma alone and that the interstitial cells may be one source of this hormone. It is a tissue stimulant and with its increased production by the enlarging follicle, as the cycle progresses the epithelial cells lining the acini become larger, and mitotic figures appear in increasing numbers. They are still irregularly placed but the tendency to radiate toward the basement membrane is apparent and the outline of the gland becomes tortuous. The blood vessels at this stage show no significant changes. When the intrafollicular tension reaches the bursting point a rupture in the wall occurs and the ovum is extruded. Smith[16] believes that the Call-Exner bodies in the wall of the follicle contribute a glycogen or sugar to the follicular fluid which raises the osmotic tension to such a point that rupture usually follows. If, on account of inflammatory or other changes, the tunica albuginea is thickened so that the ovum can not be extruded, a cyst of varying size will develop and its fluid content may contain sufficient theelin to maintain the endometrium in a continued proliferative state. With the rupture of the follicular wall and subsequent ovulation the accumulated follicular fluid is lost but the empty follicle fills with blood, which usually clots immediately. Beginning luteinization produces characteristic changes in the follicle so that it becomes lined with a gradually thickening wavy layer of yellow tissue and the production of corpus luteum hormone begins. Simultaneously the histological changes in

the endometrium are more clearly defined and in approximately 48 hours after ovulation the appearance is so striking and clear cut that it is unmistakable in properly secured and sectioned material. Where the preovulatory specimen showed the acinar nuclei to be irregularly placed, they have now definitely radiated toward the basement membrane but separated from it by a clear vacuolated area. This subnuclear vacuolization, with the gland cells ranging into line, was determined to be the earliest sign of ovulation in monkeys by Hisaw,[6] and also in humans by Sturgis and Meigs.[17] The stroma becomes edematous, the blood vessels are more prominent and their walls show increased thickening. The concentration of theelin maintains the endometrium in a proliferative state and at the same time the secretory activity of the corpus luteum manifests itself by the changes in the epithelium lining the acini so that the papillary infolding becomes a prominent feature; the glycogen which had filled the clear spaces in the early days of the postovulatory phase oozes past the nucleus, allowing the latter to rest on the basement membrane; the lumen contains a varying amount of secretion and the entire gland assumes a fuzzy appearance. When the theelin and corpus luteum influences are at their height, the endometrium reaches its maximum thickness, the gland acini become distended with secretion and at this stage the endometrium is prepared to embed and nourish the ovum provided fertilization has taken place. If such is the case, the stromal cells of the endometrium are converted into decidual cells and the secretory activity of the acini continues at an increasing rate because the corpus luteum shows no signs of regression. However, if fertilization has not taken place, the amount of theelin and corpus luteum decreases quite rapidly and the proliferative and secretory stimuli are correspondingly diminished. Then menstruation occurs, and the cycle commences anew. It should be emphasized that these successive endometrial changes are merely the reflection of the function of the ovary. If the mechanism is intact a normal cycle results, but if this is disturbed the endometrium will show one of several pictures and the clinical symptoms will vary accordingly. With this in mind we have correlated the clinical symptoms with the histological examination of the endometrium and grouped our cases on the basis of ovarian function ranging from normal activity to complete dysfunction. Such a grouping consists of three columns, representing the clinical picture, endometrial findings, and ovarian functional status, respectively.

CLINICAL	ENDOMETRIUM	OVARY	
		THEELIN	CORPUS LUTEUM
Normal	Normal	Normal	Normal
Oligomenorrhea	Delayed Ovulation	Normal	Reduced
Sterility	Persistent Proliferative	Normal	Absent
Bleeding	Hyperplasia (1) Cystic Dilatation (2) "Swiss Cheese"	Increased	Decreased or Absent
Amenorrhea	Hypoplasia	Decreased	Decreased
Castration	Atrophy	Absent	Absent

There must necessarily be some overlapping in the group of clinical symptoms, but the clinical condition listed represents the most common clinical counterpart for the corresponding endometrial and ovarian pictures. Inasmuch as the facilities for making endocrine assays of blood and urine have not been available to us, we have listed the theelin and corpus luteum levels at various stages of ovarian failure, as described in reports by Burch,[1] Wilson,[19] Frank,[3] Fluhman,[2] and Kotz and Parker.[8] It is true that there is some variation in the timing of ovulation even in the normal cycle. Rock and Bartlett[13] state that 75 per cent of normal women between the ages of twenty-five and forty have a secretory phase lasting twelve to sixteen days. We have used this to define a normal secretory phase, and have marked the beginning of such a phase from the first appearance of subnuclear vacuolization. The first sign of ovarian failure seems to be reduced corpus luteum activity with delayed ovulation and consequently a shortened secretory phase. Further

ovarian deficiency causes an absence of ovulation with resulting disappearance of corpus luteum activity, and a persistent proliferative phase in the endometrium. Such a patient may menstruate with a fair degree of regularity, but it is of the anovulatory type. Recognition of this is of special importance in the sterile patient. Endometrial hyperplasia with persistent bleeding is frequently encountered in medical practice. In this condition the theelin production is usually increased so that the endometrium is being constantly stimulated. The corpus luteum which acts as a check on this stimulating property of the theelin is usually decreased although in some instances the hyperplastic endometrium will show postovulatory changes. The hypoplastic endometrium is thin, the number of acini is reduced and the stroma is edematous. The ovary is deficient in both theelin and corpus luteum production. There is insufficient stimulation to activate the endometrium and the resulting amenorrhea will persist until sufficient theelin accumulates to bring about proliferative changes. When the theelin and the corpus luteum are completely absent following bilateral oöphorectomy, complete sterilization by radiation, or the destruction of the ovarian tissue by infection, the endometrium is reduced to a very thin layer of stromal tissue containing only an occasional acinus.

Decreased menstruation was the chief complaint of twenty-nine patients. All these patients showed genital hypoplasia on physical examination, and a thin hypoplastic endometrium on biopsy. There were no other clinical findings constantly present. Only seven patients (24 per cent) were obese. Relatively few complained of dysmenorrhea. Friedman test was done before endometrial biopsy wherever pregnancy could not be ruled out by pelvic examination. Two subdivisions of this group were analyzed; (1) regular scanty periods (hypomenorrhea), and (2) irregular scanty periods (oligomenorrhea). Endometrial biopsy showed normal ovulation changes in most (73 per cent) of the eleven hypomenorrheic patients, the remainder having no ovulation. In the eighteen oligomenorrheic patients, however, only one (5.5 per cent) showed normal ovulation, seven had delayed irregular ovulation, and ten showed a persisting proliferative phase with no ovulation. It is apparent that patients with delayed scanty menses are much less liable to be ovulating normally than those with regular scanty flow. It was formerly believed that delayed periods were due to an excessively strong corpus luteum effect. Only one patient of the twenty-nine in this group showed early ovulation, evidenced by finding subnuclear vacuolization nineteen days premenstrual. Most of the remaining patients, especially those with oligomenorrhea, showed weakened corpus luteum effect accompanied by a persistent proliferative phase with no ovulation.

Endometrial biopsies were taken from twenty-two patients complaining of recently acquired excessive uterine bleeding. Clinical examination showed sixteen of these to be due to functional causes, which is an abnormally high percentage because this was a selected group. Biopsy showed in each case an endometrium somewhat thicker than normal, but no specific type of endometrium that might be said to be constantly present in functional uterine bleeding. The types of endometrium present included: three patients, normal; four patients, delayed ovulation; three patients, persistent proliferative; and six patients, hyperplasia, including cystic dilatation and so-called Swiss-cheese types. It is difficult to correlate clinical and endometrial findings in this type of case, because some of the most severe bleeding cases showed a normal endometrial cycle. Likewise, ovulation might or might not be present, irrespective of the severity and duration of the bleeding. Several of these cases had thorough diagnostic curettements subsequent to endometrial biopsy. No case was found where endometrial biopsy had overlooked carcinoma of the fundus. However, considering the small amount of tissue obtained, the value of negative endometrial biopsy in the diagnosis of carcinoma must remain an open question. It is likely that conventional dilatation and curettement will continue to be of more value than endometrial biopsy for this purpose.

Endometrial biopsy is essential in making an extensive investigation into the causes of sterility. After a complete history and physical examination of the wife is made to rule out organic causes, insufflation shows the tubes to be patent, and semen examination from the husband is satisfactory, attention is turned toward possible

functional factors, chief of which is the question of ovulation. Our report includes fourteen patients in this classification. Endometrial biopsy showed ten to have normal ovulation, and four to have no ovulation. Of these four anovulatory patients, two were having delayed periods, and two were having regular flow at intervals of twenty-six to twenty-eight days. The presence of regular menstrual periods does not guarantee the occurrence of ovulation. Rock[14] has reported that 9 per cent of 392 cases studied had occasional anovulatory periods. At the present time endometrial biopsy is the only practical way to determine if and when a patient has ovulated. Both of these facts have obvious application in the treatment of sterility.

Endometrial biopsy was performed on a group of normal postpartum patients with the purpose of determining the time of reappearance of ovulation, with consequent fertility. Biopsies were secured only after the uterus had returned to approximately normal size, and endometrial integrity was reëstablished. In 21 patients, biopsies were taken at intervals varying from three to twenty-four weeks postpartum. Ten patients nursed their babies for two to nine months. Of this number, eight patients (80 per cent) began to have periods and ovulation only after weaning their babies. Average duration of nursing was three and one-half months, which was followed at five months by anovulatory flow and at five and one-half months by the first ovulation. Two patients (20 per cent) had regular periods and ovulation begin while still nursing their babies. One of these, nursing for seven months, had periods begin at two months postpartum, and ovulation begin at five months. The other, nursing for nine months, had periods and ovulation begin at six and six and one-half months, respectively. In the eleven patients who were unable to nurse their babies, periods began on the average at two months postpartum, and ovulation appeared first at five months, or later. In answer to the question of whether menstrual periods or ovulation reappear first in the postpartum patient, analysis of these cases shows that in most of this group (95 per cent) one, or more, anovulatory periods occurred before ovulation appeared. In one patient (5 per cent) this sequence was reversed. She nursed her baby only three weeks, at six weeks signs of ovulation appeared, and at eight weeks occurred her first postpartum menstrual period. The amount of endometrium available throughout the entire postpartum group was found to vary within wide limits. In some it was profuse and in others only a scant amount was found. The reason for this variation was not apparent inasmuch as no correlation with clinical condition was possible. In general, the early postpartum endometrium (one to three months) tended to be the hyperplastic type with cystic spaces and edematous papillary outgrowths, while later (three to six months) the endometrium was apt to be in either resting or proliferative phase, and more normal in appearance.

Summary

1. Three hundred and fifty-two endometrial biopsies were taken from 114 different patients, and the results analyzed to correlate the clinical pictures with the endometrial findings.

2. Biopsy may demonstrate any type of endometrium in—(a) decreased menstruation (most cases have hypoplastic endometrium in persistent proliferative phase), (b) functional uterine bleeding (most show hyperplasia).

3. Sterility patients must have endometrial biopsy to determine the occurrence and time of ovulation.

4. Endometrial studies on postpartum patients showed that—(a) 80 per cent of nursing mothers had neither periods nor ovulation until after discontinuing nursing, (b) 95 per cent of postpartum patients had one, or more, anovulatory periods before ovulation began.

5. Interpretation of findings: (a) normal secretory phase indicates intact pituitary-ovarian mechanism, (b) shortened secretory phase (delayed ovulation) is the first endometrial sign of ovarian failure, (c) negative endometrial biopsy does not eliminate possibility of carcinoma of fundus, (d) endometrial findings are the same in either primary or secondary ovarian failure.

6. Because the endometrium reflects ovarian function, endometrial biopsy is a necessary aid to a complete history and physical examination in the management of a functional pelvic disorder.

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A MALIGNANT SOLITARY POLYP OF THE SIGMOID COLON CAUSING INTUSSUSCEPTION

Case History

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This case is worthy of record for three reasons: first, single polyps of the colon infrequently require abdominal section for their removal; secondly, intussusception of the colon produced by a polyp is rare; thirdly, the polyp presented here demonstrates again that malignant changes begin at the distal end and involve the base at a later date.

The majority of single polyps of the large bowel can be removed by instrumentation through the rectum. When a polyp is discovered beyond the reach of a sigmoidoscope, laparotomy is required. Two technics are to be considered.

C. H. Mayo and W. L. Butsch have shown that direct removal with primary closure of the gut is a safe procedure when the colonic wall is otherwise normal and adequate pre-operative preparation is made. However, when there has been interference with the blood supply of the gut wall, as in our case, the safest procedure is that employing exteriorization such as employed in the Mikulicz technic.

Mrs. ———, aged twenty-four, at irregular intervals during the last three years, complained of attacks of generalized abdominal cramps which were often associated with nausea, anorexia, constipation and diarrhea. These attacks did not prevent her from working but she occasionally sought medical advice from one of us (W. L.). Examination at these times revealed no objective findings and the condition was believed to be a mild enteritis.

The onset of the last attack awakened her with severe abdominal cramps in the lower left quadrant and which she attributed to dysmenorrhea. The pains became progressively worse and were associated with backache and an urgent desire to defecate. Enemas were taken without relief. There was no nausea, vomiting, urinary disturbances or bloody discharge. About twenty hours after the onset she called her physician, who sent her to the hospital.

Examination revealed the patient to be free of disturbing pain, temperature 98.2 F., pulse rate 90 per minute, blood pressure 124/80. The only pathology presented was found upon abdominal and pelvic examination. Filling most of the lower left quadrant was a movable tender mass extending from the pelvis to the superior iliac spine. There was no muscular rigidity.

Vaginal examination revealed the mass to be smooth, tender, and it filled the left adnexal region. The uterus was displaced upward and forward. Upon rectal examination the lower end of the mass was palpated with difficulty; there was a slight amount of blood.

Laboratory examination revealed: urine—specific gravity of 1.022, with a trace of acetone. White blood cells, 9,000; Polys, 74 per cent; filamented cells, 55 per cent. Kahn test was negative.

Exploratory operation was performed February 1, 1938. A complete intussusception of the sigmoid colon, measuring 18 cm. x 6 cm., was found. The bowel wall was very edematous, measuriing one centimeter in thickness. After reduction a pedunculated tumor was found in the lumen in the upper one-half of the sigmoid loop. A Mickulicz type resection was done. Hospitalization lasted three weeks; she made an uneventful recovery.

Tissue report by Dr. H. C. Cope: The material consists of papillary mass, 5 x 3.5 x 2 cm. attached to a small pedicle 2 cm. in length. Microscopic sections show papillary structure composed of edematous stroma and numerous round and ovoid glands. In some areas the glandular epithelium shows staining variability and a tendency to invade the surrounding stroma. There is no involvement of the stalk at its intestinal end. Diagnosis: Papillary adeno-carcinoma, grade 2.

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SYPHILIS CONTROL IN MICHIGAN AND OUR NEW PRENATAL LAW*

The Advisory Committee on Syphilis Control of the Michigan State Medical Society has requested that the following summary of the aims, accomplishments, and future problems of syphilis control for Michigan be published in THE JOURNAL of the Michigan State Medical Society. In addition, it was requested that the essential features of our new Prenatal Law be given similar publicity.

The need to reduce the serious inroads by syphilis on the health of our citizens is generally recognized and heartily approved by our medical profession. It is likewise recognized that its incidence could be very rapidly reduced by effective control measures now available. The only question subject to argument is the method to be employed. The medical profession objects to the ever-increasing pressure to make the management of genito-infectious diseases the function of the state and set up facilities for their management entirely out of its hands at state expense. We object to the pauperizing of our citizens and the use of these diseases as another entering wedge to force the socialization of medical care. We believe that the practicing physician is an indispensable cog in such a control program, and that his interest should be encouraged. It is our aim to do this in Michigan. We have a wonderful opportunity to show the nation that such a program can be successful and have a greater permanency than the free clinic plan, so widely accepted in other states. To be successful, however, we must have the enthusiastic cooperation of the medical profession. We must appreciate the seriousness of the problem, and overcome the apathy shown by the majority of our profession. If we insist on pursuing a stand-pat policy, the socialization of genito-infectious diseases will most certainly be forced upon us. The solution lies in our own hands, if we will meet it.

A successful syphilis control program may be simply stated. Its aim should be finding and effectively treating all cases of infectious syphilis in any community. This means all cases of syphilis of less than five years duration, including early congenital syphilis, and all women having syphilis during pregnancy. All other cases of syphilis can be forgotten, as a communicable disease problem. We agree with Keys, who states "that eight out of ten persons with syphilis cease to be infectious after three years, even though they do *not* receive treatment; 99 out of 100 cease to be infectious after four years, and the proportion of infections from persons with syphilis of more than five years standing is infinitesimal." The problem of finding and treating all cases of infectious syphilis is not, however, as easy as it sounds. We will first consider the finding of such cases.

Unfortunately, persons having early syphilis are seldom acutely ill and the lesions of primary and secondary syphilis are commonly insignificant and frequently overlooked. One-third of all men and two-thirds of all women go through this infectious period without realizing they have anything the matter with them or seeking medical advice. Many report only to counter-prescribing druggists or fail to secure a correct diagnosis, even when reporting to a physician. It is probable that less than 25 per cent of the new cases of syphilis occurring in any community are ever diagnosed in the early or infectious stage of syphilis.

Every possible effort should be made to find such early cases. This means more lay education, stressing the mild character of the early syphilis and urging the need of medical consultation. Our physicians must be more uniformly capable of diagnosing these cases. There must be more widespread use of immediate darkfield examinations and serologic follow-up on all genital lesions. The coöperation of the ethical druggists must be secured in policing their own ranks and curbing counter prescribing. One of the most effective ways of finding infectious cases in any community is through recognized cases. Proper investigation for sources and contacts of such recognized

*This report is presented by the Advisory Committee on Syphilis Control, which was composed of the following: Loren W. Shaffer, M.D., Chairman; R. S. Breakey, M.D., R. H. Holmes, M.D., Wm. A. Hyland, M.D., H. R. Roehm, M.D., C. K. Valade, M.D., Udo J. Wile, M.D.

cases is the most effective way of finding such foci and "nipping in the bud" those small epidemics of new cases that may occur in any community. Our medical profession has been reticent in assuming this obligation. This is a duty that we must shoulder as readily as we accept the responsibility in other communicable diseases. It is also the duty of health departments to encourage such source and contact finding and offer aid to physicians in this work.

It is likewise discouraging that so few of our recognized cases of early syphilis receive sufficient treatment to offer much promise of cure or to even permanent control of infectiousness. Probably less than one-fourth of such cases receive adequate treatment. It is felt that the most important factors in holding patients to treatment are education in advance, as to the seriousness of the disease and the amount of treatment necessary, good technic, reactionless treatment, encouragement as to cure, financial adjustments and, only rarely, recourse to threats of reporting the case to the health agencies. The cost of treatment has been overstressed as a cause of lapse, since free clinics usually have a larger incidence of lapsed cases than private physicians. It is a responsibility of our health departments to supply follow-up service where requested for infectious cases of syphilis lapsing treatment. It is not necessarily their responsibility to do so for late non-infectious cases.

What, therefore, is the status of present efforts at syphilis control? We are recognizing only 25 per cent of our early cases, and effectively treating only 25 per cent of these. This means that only one case of early syphilis in 16 is adequately controlled. The prevention of congenital syphilis has not been discussed. Our new Prenatal Law will help in bringing to the attention of our physicians the urgency of examining *every* pregnant woman for syphilis. It is hoped that such examinations will be made as early in pregnancy as possible, and that adequate treatment will be arranged for all such cases. If this is done, our problem of congenital syphilis will largely disappear.

We feel that our Advisory Committee on Syphilis Control of the Michigan State Medical Society has contributed much to the development of a satisfactory program in Michigan. This Committee was appointed in November, 1936, and has been continuously active since that date. Among our major activities, the following are especially worthy of review:

1. Preparation of outline talks with illustrative lantern slides for use before both lay and professional audiences. The Joint Committee on Health Education have coöperated in acting as a distribution center and supplying speakers.
2. Preparation of approved outlines of treatment for the most common stages and clinical types of syphilis, with a similar outline covering common reactions to treatment and their prevention and management. These have been widely distributed and are constantly available through our State Health Department.
3. Advice and guidance to our State Health Department in the establishment of free diagnostic laboratory service, the distribution of free drugs, and new reporting forms.
4. An active part in drafting our revised Prenuptial Law and securing its adoption with the assistance of our Legislative Committee and the State Legislature. Similar preparation and adoption of our present Prenatal Law.
5. Coöperation with the Junior Chamber of Commerce of Michigan in lay education and publicity programs.
6. Preparation and distribution by the Michigan State Health Department of dignified metal placards, calling attention to syphilis and the hazards of quack medication, for display in public toilets.

Our work has just begun. The most difficult part of our program is still ahead. The details of our "find and treat" program must still be brought to the attention and sold to our medical profession. We plan to continue our efforts at further, even more intensive, educational programs to both the laity and the medical profession. We have requested that each of our larger county medical societies have a Syphilis Control Committee and that the smaller units appoint a representative. The chairman or representative of such societies should be invited to meet with our State Committee to review the general Syphilis Control Program at the time of our annual meeting.

Our professional education talks should stress the importance of prompt and proven laboratory diagnosis of early syphilis. They should urge the necessity of source and

contact findings of all such early cases and the necessity of holding them to, at least, the minimum modern standards of treatment.

More aid is urgently needed by both our local and State Health Departments in assisting with source and contact finding and returning of lapsed early cases to further treatment. It is further requested that a full-time field secretary be appointed to our committee to develop and coördinate our county programs and educational efforts. It is requested that this appointee represent the Michigan State Medical Society in such efforts and salary be paid jointly by our Society and the Michigan State Helath Department, similar to like positions with the Maternal Welfare and Cancer Programs.

* * *

The essential features of our present law requiring a prenatal blood test on all pregnant women are, as follows:

"Every physician attending a pregnant woman in the State of Michigan shall, in the case of each woman so attended, take or cause to be taken a sample of blood of such woman at the time of first examination, and submit such sample to an approved laboratory for a standard serological test for syphilis. Every other person permitted by law to attend upon pregnant women in the state, but not permitted by law to take blood tests, shall cause a sample of the blood of such pregnant woman to be taken and submitted to an approved laboratory for a standard serological test for syphilis.

"In reporting every birth and stillbirth, physicians and others permitted to attend pregnancy cases and required to report births and stillbirths, shall state on the birth certificate or stillbirth certificate, as the case may be, whether a blood test for syphilis has been made during such pregnancy upon a specimen of blood taken from the woman who bore the child for which a birth or stillbirth certificate is filed and, if made, the date when such test was made, and, if not made, the reason why such test was not made. In no event shall the birth certificate state the result of the test.

"Such tests and reports shall not be made a matter of public record but shall be available to local health officers and to the physicians treating the patient."

It is felt that this law will accomplish much towards the eradication of congenital syphilis in Michigan. The test should be a part of the routine examination of every pregnant woman, regardless of her social or financial status, at the time of the *first* examination. It is hoped that lay educational efforts will help in bringing such women to their physicians early in pregnancy. If the presence of syphilis is recognized by the fifth month of pregnancy and adequate treatment given, the birth of a normal baby is almost assured. This is the highest type of preventive medicine. The discovery of the presence of syphilis at delivery through a cord Wassermann, although desirable if previous test could not be made, is inadequate, since the most highly effective treatment for congenital syphilis is preventive treatment given the mother before delivery. The new birth certificates are now in use. It is hoped that the great majority of our birth certificates will show that the test has been made early in pregnancy.

STORED BLOOD TRANSFUSION IN A RELATIVELY SMALL GENERAL HOSPITAL*

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Much has been written concerning the properties of stored blood and its use in highly organized closed-staff institutions,[5,9,14,21,26] but little attention has been paid to the problems of establishing such systems in relatively small open-staff general hospitals. We have spent nearly a year organizing a system of stored blood transfusion in such an institution, without especially appropriated funds and without specifically assigned assistance. Because the problems of most general hospitals are similar, the details of organization and control are presented with the hope that they may prove helpful to those who wish to establish a similar transfusion service.

A statistical comparison of the three methods of blood transfusion now in use at Hurley Hospital further emphasizes the advantages of our blood bank. The attending staff has recognized the desirability of utilizing this system and is gradually discarding the other two. We feel that we

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have established a method of transfusion that is successful, safe, and above all practical.

History

Storing blood for transfusion was first suggested by Hedon in 1901.[63] Abel[1,2] in 1913-14 visioned emergency operating room transfusion from blood stored in the operating room icebox. He mentions Nagel's transfusion of dogs with four-day-old refrigerated cell suspensions. Lardenois[9,23] transfused dogs with four-day-old blood in 1916. Panum and Cornu stored blood for three weeks, noting that the blood retained its cytological elements intact. Two years later, Robertson[5,56] transfused twenty-one times with stored blood.

The use of cadaver blood evolved from the work of Shamov between 1927 and 1929.[60] He began by testing the sterility of the systemic blood of dog cadavers stored for varying lengths of time at various temperatures. To disprove the toxicity of stored blood, exsanguinated dogs were transfused. When no apparent bad effects ensued Yudin[66,67] used human cadaver blood in man with success. Many transfusions were being done by 1931 from this source, often using thirty-day-old blood.

In 1934, Servantie, Jeanneney and Julien-Viroz[33] experimented with stored donor's blood, found it satisfactory, and began its employment. From this came the so-called "blood bank" in this country, most widely publicized from the Cook County Hospital in 1937.[21,22]

Stored placental blood was successfully utilized on a large scale by Bruskin[9] in 1936 and within the year by many others. Goodall[26] often kept this blood for sixty days.

Today stored blood, both donor and placental, is being widely used throughout the world.

Organization

After reviewing the literature, not only concerned with the use of stored blood, but about transfusion by one of us as a whole,[65] we became convinced of three things: First, that our relatively high percentage of reactions could and should be lowered; second, that more transfusions, emergency and otherwise, were needed; third, that the first two faults could be remedied if a convenient procedure were adopted in which half the pretransfusion testing could be done on blood drawn hours or days before the need for it should arise.

Beginning in October, we stored unused blood drawn for transfusion. We learned to preserve blood by conducting certain experiments with it. The quantity of blood stored slowly accumulated and its occasional use in extreme emergencies brought satisfactory results and secured gratitude, respect, and finally faith and dependence in the method by the various attending doctors.

As its use increased, the sources of blood increased to include therapeutic phlebotomy in symptomatic hypertension and congestive heart failure. Occasionally, a relative or former patient volunteered extra donations until by December, 1938, our supply was sufficient to maintain the three common types, A, B, and O. Since then, a rapid reverse in the proportion of regular transfusions to bank transfusions has taken place, until now stored blood is used 90 per cent of the time. Type AB blood has constituted about 2 per cent of donations and consequently is available less than half the time. Recently, a service organization offered to donate blood. It is hoped that AB blood from this source will maintain a full bank of all types and that the occasional imbalance between supply and demand in any one type can be positively offset by leisurely donation from this source.

In order to maintain a standard controllable technic, the resident staff has done all blood-letting and is responsible for the securing of replacements, for the care of the blood, charge slips, handling and administration of the blood. The storage records, checking for hemolysis, and overseeing of the blood in storage has been handled by the resident pathologist and no more than one other in his absence. This is important to eliminate the hazard of personal error. Orders for transfusion must state the amount wished and the desired time of administration to save confusion. Universal donor transfusions are not allowed[3,8,12,15,25,36,40,46] without special permission in emergencies when the bank is depleted of the type desired.

Charges consist of a laboratory fee of $4.00 for typing, Kahn and cross-matching, plus $5.00 for each 600 c.c. given or frac-

tion thereof, no matter how many doses. The latter fee is to cover operating room expenses for taking replacement blood. It is an absolute rule that blood in the bank may not be purchased. Patients desiring replacement by professional donor make their own arrangements independent of the hospital.

Investigation of Storage Factors

In the evolution of our present system some control measures were advisable. Observations on the blood during storage led to certain investigations.

During the initial phase of development and periodically thereafter cultures were made of each lot of stored blood. Because these cultures were consistently negative, this check has been restricted to cultures on an occasional lot of blood.

Hemolysis is the outstanding cause of loss of blood from aging and many factors influence this change. Proper citration[34,43,50] of blood proved essential to satisfactory storage. Several lots containing excessive citrate (150 c.c. or more per 500 c.c.) have undergone rapid hemolysis in early stages of storage. It was found that small amounts of citrate, such as 50 c.c. per 500 c.c. of blood, which was usually calculated to be adequate, frequently resulted in clotting during storage. This difficulty was eliminated by the use of 70 to 80 c.c. of citrate, which was adopted as our standard volume.

The effect of hydrogen ion concentration of citrate on hemolysis has been studied[11,27] and commercial citrate solutions were found to be alkaline, necessitating correction to a range of 6.8 to 7.6. Repeated checks here revealed our commercial citrate to range from 6.7 to 7.2. Since this represents the lower optimum limit and our experimental studies on the effect of hydrogen ion concentration on hemolysis do not justify the formation of an opinion, we have not attempted to adjust the Ph of our citrate. Checks on the Ph of our commercial saline show it to range about 5.8. This acid solution may have some effect on hemolysis during transfusion, consequently as little saline as possible is employed during the actual administration of blood.

The other factors influencing hemolysis are agitation of the blood and temperature change. It was found that agitation,[28,32] whether done carelessly or in an attempt to divide large lots of blood, produced rapid and marked hemolysis. To permit division of blood lots, salvarsan tubes of a 375 c.c. capacity have been adopted as the standard storage vessel. Temperature change by allowing the blood to stand at room temperature produced a similar effect. For this reason a refrigerator which is part of the hospital system and free from the vibration of the usual small electric unit was chosen. Needless disturbance of blood and temperature change have been eliminated by securing locks for the refrigerator. A temperature of 2 to 4 degrees centigrade has been satisfactory. Freezing of blood results in hemolysis and clotting.

The rate of hemolysis and diffusion of inorganic elements from the cells to plasma has recently been shown to be influenced by the area of interphase between plasma and cells.[58] This is another reason for the selection of salvarsan tubes in preference to flasks as storage vessels.

Determination of the degree of hemolysis by gross examination was found to be uncertain. Talquist and Sahli determinations were impossible because of the low values. A set of standards was devised for checking hemolysis. These were prepared from discarded blood, using dilutions in distilled water. A set of ten Kahn tubes containing 0.25 per cent to 5 per cent of citrated blood by volume was employed. These were refrigerated unstoppered. New standards were prepared every three to four weeks. After centrifuging a sample of stored blood for cross matching, the plasma was compared to the standards. Hemolysis of 2 per cent produced a very marked color change and we have established this arbitrary limit for administration. It was observed that hemolysis below 1 per cent produced only slight change but values above this produce marked change.

White to yellow stringy debris was noted in many tubes of stored blood. Smears and paraffin blocks of this material showed it to consist of fibrin and leukocytes. Many authors believe this to be innocuous, but we feel that removal by filtration at the time of transfusion at least eliminates needle plugging.

Technic of Taking, Storage and Administration

Donors are asked about their past and present health and their blood pressure is taken. The blood pressure cuff is set at 20 mm. of mercury above diastolic pressure and closely watched and adjusted as phlebotomy proceeds to assure a rapid flow of blood.

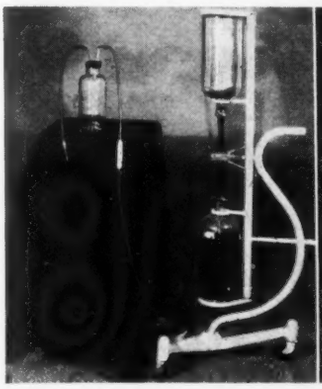

Fig. 1. Blood-drawing Apparatus.

The materials used are obviously available as standard equipment in any hospital, with the exception, perhaps, of the suction device. Some prefer not to use suction, and we object to the employment of mouth section. The ordinary Wangensteen with the addition of a trap bottle is satisfactory.

Fig. 2. Storage Compartment.

When possible a box incorporated in the general hospital system is preferred to small mechanical units. The advantages are enumerated in the text.

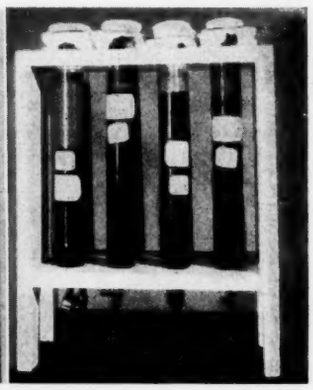

Fig. 3. Tubes of Blood in Storage.

Description and advantages over flasks are described in the text. The labels are those of the blood record and read as follows:

Donor: John Doe
Date: 11-1-38
Amt. Bl.: 600 c.c.
Amt. Citrate: 100 c.c.

The tube on the left shows the plasma most clearly.

Blood-letting is done by a closed method to minimize contamination. A 1,000 c.c. wide-mouth bottle or flask is used with a two-hole stopper from which protrudes glass tubes bent at right angles (Fig. 1). A short intake amber rubber tube connects directly to the needle. The outlet tube connects to a low pressure Wangensteen with a gauze trap intervening. This trap is made from an intravenous dropper. Stirring and shaking are not allowed since partial defibrination results in chills. Uniform citration is assured by giving the bottle a swirl every two to three minutes by the clock.

An initial 35 to 40 c.c. of a 2.5 per cent solution of sodium citrate is drawn into the receiving bottle, citrating the needle and the entire system. This proves the patency of the system as well as wetting all surfaces. The balance of the total allotted 70 to 80 c.c. of citrate per 500 c.c. of blood is drawn into the bottle at the completion of phlebotomy.

Sterile drapes are applied to the arm after preparation, about 0.1 c.c. of 0.5 per cent procaine hydrochloride solution is injected intradermally just away from the chosen vein. The skin is nicked with a No. 11 knife to avoid plugging the needle with skin. A No. 13 to 16 gauge needle is then inserted through the skin, moved to the side of or directly over the vein ready for insertion. If a shovel-nosed needle is used, the vein is entered by a quick hop to avoid dissecting the vein coats. If a stylet-pointed needle (Unger) is used, a steady push until blood flows freely is preferable to avoid going through the opposite wall. A refinement in technic which prevents early needle clots is insertion of the needle against the direction of flow of blood, *i.e.*, toward the fingers.

At the end of the phlebotomy, blood for a Kahn and for typing is taken, being careful to avoid citration. The blood is filtered through a funnel packed with six to eight layers of gauze into as many citrated salvarsan tubes as needed. Care is taken not to fill above two inches from the top to prevent wetting the gauze used as a cover. Cotton plugs are not allowed. Filtration at this time removes clots which might prove embarrassing if found at the time of transfusion. These tubes are marked with the donor's name, date, amount of blood, amount of citrate, and blank spaces are left for the recording of type, Kahn and lot number (Fig. 3).

The entire blood-letting apparatus is im-

mediately rinsed in cold water, rolling the tubing between the fingers to dislodge clots. The inside of the needle is scoured with Bon Ami if necessary, to make it shine and prevent early clot formation. Next, the apparatus is washed in freshly distilled water, completely draining all water collections from the tubing and bottle to eliminate the generation of pyrogen[10,45] in the interval before autoclaving. The gauze for filtering is rinsed in distilled water just before autoclaving and if not dry at the time of use it is rinsed with normal saline or citrate to prevent hemolysis.

At the conclusion of phlebotomy the storage tubes are placed in a wooden rack, immediately taken to the "intake" side of the bank (Fig. 2), and the Kahn and typing tubes taken to the laboratory. The following day, the blood is typed, Kahn-tested, given a lot number, checked for hemolysis, entered in the book which is kept in the icebox, and moved to the "outgoing" side of the box (Fig. 2). Its legend is also entered on the outside of the door. The blood is checked every day, principally for hemolysis, and okayed by dating.

We have learned to recognize impending hemolysis by a tinting of the interphase between the plasma and cells (Tube 4, Fig. 3). When this end-point of storage seems imminent plasma is drawn off by using a long glass tube connected to a phlebotomy set. The employment of salvarsan tubes for storage facilitates the withdrawal of plasma without waste or contamination by red blood cells. Like types are pooled. Plasma apparently keeps indefinitely and is used in treating shock where blood loss does not obtain[7,20,30,35,49] such as in the treatment of major burns,[34,35,64] spinal shock from the onset of acute peritonitis. It is also employed in the cachectic individual where no significant anemia demands whole blood (Table II).

Cross-matching, using fresh samples from the recipient, is always done before each transfusion[15,39,52] unless the same lot number of blood is used within less than seven days.[4,19,32,42,54] Transfusion with another portion of the same lot of blood to the same recipient is not allowed after seven days because of the danger of the repeat donor (Table I). If it becomes necessary to give blood in which the least hemolysis is present 60 grains of sodium bicarbonate are administered to the recipient from one to two hours before transfusion unless the urine (fresh) is distinctly alkaline.[3,6,8,17,46]

Blood may be given cold if necessary, but it is usually warmed in tepid (never hot) water under the direct supervision of the interne. The blood is again strained through a gauze-packed funnel into the usual Kelly bottle intravenous dripping system which has previously been started with saline (never Ringer's solution or glucose in distilled water). Excess saline is removed from the Kelly bottle at the time the blood is poured in. Saline is not added to the Kelly bottle until all of the blood has been taken. Heat jackets and hot water bottles are not allowed. The ideal rate of administration is 40 to 60 drops a minute, but when the occasion demands it may be speeded up to a steady stream.

The patient is observed for reaction very closely during the first 20 to 40 c.c. by watching for changes in the radial pulse as well as for the other usual signs and symptoms of reaction.[65] Checking continues by the interne until the first 100 c.c. of blood have been taken. A nurse is then assigned to watch the patient in the same manner during the balance of the transfusion. The administration is stopped on the least provocation. Patients developing reactions are observed for hemoglobinuria and icterus for several days, given another freshly cross-matched transfusion or treated for uremia as the occasion demands. Other types of reactions[65] are treated symptomatically.

The intravenous apparatus, storage tubes, gauze, and funnels employed are cleansed in the same way as the phlebotomy sets, first on the floor where the transfusion was given, and then in the operating room. New intravenous tubing and stoppers are treated with soaking in 10 per cent sodium hydroxide for thirty minutes or boiling in a 0.1 per cent solution, for five minutes.

Statistical Analysis

In order to evaluate our results, all transfusions done from July, 1938, to June 10, 1939, have been analyzed. They have been divided into three groups: those done with an open method employing a stirring rod for mixing the citrate, those done by a closed method, and those in which stored blood was used.

The criteria used in establishing reac-

TABLE I.

	Stored Blood				Closed Method of Taking Blood				Open Method of Taking Blood			
	No.	%	Reactions		No.	%	Reactions		No.	%	Reactions	
			No.	%			No.	%			No.	%
Number of Transfusions	220				177				63			
Average Vol. c.c.	366				359				381			
Deaths from Transfusions	0				0				0			
Definite Reactions — All Types			16	7%			27	15%			19	30%
Questionable Mild Reaction			6	3%			8	5%			2	3%
Indeterminate Reactions			6	3%			4	2%			1	2%
Total Possible Reactions			28	13%			39	22%			22	35%
Reactions with Chills*			11	69%			16	59%			16	84%
Reactions — Fever Only*			3	19%			7	26%			2	11%
Delayed Reactions within 24 Hours*			1	6%			1	4%			0	
Reactions with Icterus*			1	6%			1	4%			0	
Reactions with Allergic Manifestations*			0				1	4%			0	
Reactions with Hemoglobinuria*			0				1	4%			0	
Transfusion in Blood Dyscrasia	5	2%	2	40%	11	6%	4	36%	7	11%	3	43%
Transfusions in Infection	115	52%	11	10%	97	55%	12	13%	37	59%	12	33%
Transfusions in Hemorrhage Only	46	21%	1	2%	26	14%	3	12%	14	22%	6	43%
Transfusions Using Universal Donor	2	1%	0		1	0.5%	0		0		0	
Transfusions without Typing	0				43	24%	6	14%	23	37%	6	26%
Transfusions with Repeat Donors: Under 8 Days	18	9%	0		26	12%	4	16%	0			
9 Days and Over	0				2	1%	1	50%	2	4%	2	100%
Transfusions without Kahn or Wass.	0				24	14%			7	11%		
Transfusions with Positive Kahn or Wass.	0				5	2%			0			

*Per cent figured against "Definite Reactions—All Types" (item 4 above).

tions consisted of: (1) all chills during or within a reasonable time after completion of the transfusion; (2) a temperature rise of over one degree unless there were definite indications that this fever was due to another cause. Subjective symptoms were accepted only when accompanied by pulse or respiratory rises not definitely accountable from other causes. Questionable reactions included those in which these criteria did not apply, but the possibility of a mild reaction could not be excluded. This was done after considerable individualization in each instance. Indeterminate reactions were those in which no possible conclusion could be drawn due to lost nurses' notes, the presence of a very stormy course in a disease, or presence in the operating or emergency room under conditions of confusion.

Table I compares the three systems of indirect transfusion used at Hurley Hospital. At first the open method was used exclusively while at present it is used only occasionally. The closed method was soon added and employed about 80 per cent of the time during the first six months.

The figures shown favor stored blood

TABLE II. STORED BLOOD

	No.	%	Reactions No.	Reactions %
Transfusions with blood less than 5 days old	111	50%	6	5.4%
Transfusions with blood 5 to 9 days, incl.	61	28%	4	6.5%
Transfusions with blood 10 to 18 days, incl.	38	17%	2	5.3%
Transfusions with blood 19 to 28 days, incl.	8	4%	4	50.0%
Transfusions given with hemolysis	24	11%	3	12.5%
Transfusions given with hemolyzed blood less than 19 days old	19	79%	0	
Transfusions given with hemolyzed blood more than 19 days old	5	21%	2	40.0%
Average age of blood given	6	Days		
Plasma transfusions (stored)	19		0	
Average age plasma (stored)	13	Days		
Plasma transfusions (not stored)	4		0	

from the standpoint of reactions. The closed system, using specific donors, shows a greater number of reactions and fails to accomplish all the desired refinements of pretransfusion testing. This is shown in the breakdown of the reaction statistics. Blood without Kahn or with a positive Kahn was given thirty-five times.[41,47,55] Known luetic blood was given to three patients with syphilis, but no evaluation of the activity of the recipients' syphilis was noted. Our figures fail to show any difference in the reactions among those without typing prior to cross-matching or with the employment of universal donors. However, our series is so small that we are inclined to put as much stress on typing and the elimination of the universal donor as is found in the general literature.[15,16,18,24,37,39,44,51,52,62,65] We are also insisting on more potent typing sera (titers of at least 1 to 10), because several errors in typing bloods have been discovered where cross matching showed incompatibility. The securing of fresh blood samples for each cross-matching is stressed, having in mind the development of abnormal agglutinins from repeated transfusion and from the disease from which the recipient is suffering.[42] This is especially notable during acute infections.[13]

The use of repeat donors more than seven days from the first transfusion was attended by the usual high percentage of reactions. In one case the reaction was severe. The number appearing under stored blood refers to different portions of the same lot given to the same recipient. These were usually given two or three days apart.

The percentage of reactions attending transfusion in the presence of blood dyscrasia and uncomplicated hemorrhage confirms that found in the general literature.[13] Our percentage of reactions in infection is low and we attribute this equally to the small amount of each transfusion,[48] to the rule of giving the blood during a relatively afebrile period, and the fact that no blood was given unless a measurable anemia existed. The large number of transfusions given in this group is chargeable to the decidedly successful combination of sulphanilamide and blood for puerperal sepsis, erysipelas, and other streptococcic infections. We regretfully report that several added transfusions became necessary because of the use of the magnesium and sulphate ions, usually as cathartics, during the course of sulphanilamide therapy. The resulting severe methemoglobinemia was most often caused by milk of magnesia. Satisfactory alleviation of the methemoglobinemia was accomplished by repeated transfusions and oxygen therapy.

Table II presents figures to confirm those found in the literature relative to reactions as storage time increases,[28,29,58,59] but disagrees with the literature by raising the time split to eighteen days instead of the usual ten to fifteen days. We are not giving aged blood now unless an extreme emergency demands it. Our figures show that minor degrees of hemolysis have no influence on

reactions unless the blood is aged. The use of blood showing more than one per cent hemolysis is discouraged.

The lack of reactions to plasma transfusion confirms that generally known to exist. We still hesitate to give plasma out of type and never give it without a minor cross-match.

Table III shows a much higher percentage of discards for hemolysis than now obtains because of our present routine of taking off the plasma before hemolysis occurs. This advantage of conservation is augmented by a few encouraging examples we have witnessed from the proper administration of plasma.[30,31] The number of discards for reasons other than hemolysis is surprisingly low. The immediate past few months has seen a noticeable improvement in technic both in the taking of blood and in its storage.

TABLE III. BANK ANALYSIS

	No.	Percentage
Blood lots	239	
Transfusions given	220	
Discard lots used for plasma	15	6.2%
Lots actually discarded	27	10.1%
Discarded—Positive Kahn	2	0.8%
Discarded—No Kahn*	4	1.7%
Discarded—Accidental; Breakage, Freezing, etc.	4	1.7%
Discarded—Clotting; In Storage	3	1.3%
Discarded—Hemolysis	14	5.9%
Average age at which hemolysis occurred	12	Days
Average age at which discarded for hemolysis	15	Days

*Specimen lost, citrated or otherwise unsatisfactory.

Summary

The details of a practical method of blood storage have been presented. This system is so successful that we recommend its use in relatively small open staff general hospitals with active traumatic and emergency services.

Stored blood has definite advantages over all other types of transfusion: first, it facilitates true emergency transfusion and eliminates the confusion and errors promoted by the pressure of emergency when other methods are used; second, it provides adequate pretransfusion testing of all blood and eliminates short-cuts which might prove disastrous both from the standpoint of reactions and the transmission of syphilis; third, it assures a standard transfusion technic and reduces transfusion reactions to a minimum; fourth, it provides a more efficient and convenient transfusion service.

Careful attention to the details of technic in taking and storing blood are essential to minimize reactions. Open methods of taking blood are definitely inferior. Salvarsan tubes possess definite advantages over other types of storage vessels. Optimum citration, elimination of agitation and constant refrigeration influence the rate of hemolysis. Minor degrees of hemolysis in blood which is not aged do not apparently affect the reaction percentage, but aged blood, whether hemolyzed or not, increases this figure sharply. The same attention to detail in administration and the early discovery of reactions is important.

Collection and storage of plasma has reduced the waste of bank blood. The administration of this plasma, where indicated, has been gratifying.

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BROMIDE INTOXICATION*

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Bromide preparations have long been utilized by both the medical profession and the laity and have been the traditional drugs of choice for sedation. They have enjoyed wide usage because of their economy, ease of administration and frequent inclusion in proprietary preparations. They may be procured without difficulty by the laity, who all too frequently consider them harmless. The beneficial effect of these drugs, when correctly used, has been appreciated by physicians, as well as the fact that deleterious and injurious effects may follow injudicious or excessive administration. The misuse of such drugs often brings about medical and neuropsychiatric complications which may become more serious than the patient's original difficulty, and indeed may jeopardize the life of the patient. It is the purpose of this report to emphasize the extensive employment of these drugs, the dangers attending their misuse and the frequent neuropsychiatric conditions associated with bromide intoxication.

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Physiological Action

Bromides are usually administered as sodium, potassium, ammonium or strontium salts and the action of all of these is approximately the same. Ingested bromide is rapidly distributed in the body to the blood cells, blood serum, spinal fluid, saliva, urine and gastric juice.[10] In the blood the activity of bromide ion is closely allied to the chloride concentration. The displacement of chloride ion by the bromide ion and the resultant disturbance of the chloride metabolism plays an important rôle in the intoxicating process. As is well known, the body possesses the ability to regulate closely the excretion of chloride and any diminution in intake is immediately compensated for by a decreased output. The bromide ion will replace the chloride ion in the blood, and the kidney tends to excrete chloride and retain bromide. When a bromide preparation is regularly administered there is a progressive loss of blood chlorides and an ion-for-ion replacement by bromide.[10] The percentage of chloride replacement is important and it is reported that a 25 per cent replacement will cause symptoms of intoxication; 40 per cent replacement by bromide has been fatal in rabbits and 45 to 50 per cent replacement has proven fatal in man.[1]

When bromide is administered to a healthy individual it rapidly accumulates in the blood. This was shown experimentally by Cross,[5] who gave sodium bromide gr. XV. t.i.d. and after one week found the bromide concentration to be 130 mg. per 100 c.c. of blood. At the end of three weeks it had risen to 210 mg., and when a salt-free diet was given the concentration rapidly increased to the dangerous level of 330 mg. When bromide administration has ceased, its level is maintained by further excretion of chloride and, without therapy, patients may continue to show a high blood bromide concentration for weeks. This was well demonstrated by Barbour,[1] whose patient had an initial concentration of 250 mg. and after nine drug-free weeks still had 90 mg. of bromide per 100 c.c. of blood.

Early bromide accumulation occurs in such diseases as anemia and cachexia, where there is a pre-existing paucity of chlorides in the body fluids. Disturbances of water metabolism such as are noted in cardiac disorders, renal insufficiency or inadequate intake of fluid tend to increase the danger of bromide intoxication.

Therapeutic Action

Bromides in therapeutic doses are frequently valuable in relieving nervous tension, anxiety and restlessness. The bromide ion affects all parts of the central nervous system but apparently exerts its greatest effect on the higher centers. It acts as a depressant to the motor and sensory areas of the brain and produces retardation of thought and its expression. When the desired effect is obtained there occurs a diminution in nervous tension, a sense of relaxation and relief from anxiety and a disappearance of restlessness and irritability.

Signs and Symptoms of Bromide Intoxication

The clinical picture of bromide intoxication may vary tremendously in different patients. It has been classified for clinical convenience into simple intoxication, advanced intoxication and psychoses associated with intoxication.

Simple intoxication presents a picture of severe depression of psychic and somatic functions with marked slowing of all psychomotor processes. The patient becomes dull, listless and apathetic and appears drowsy and fatigued. Because of lassitude the patient is disinclined toward any muscular exertion and may sleep most of the time. There occurs a marked depression of intellectual functions and the patient thinks slowly and with difficulty. He has trouble in association of ideas and difficulty in the expression of thought. The patient appears somnolent and confused and his movements are slow, clumsy and reduced to a minimum. Memory is hazy and any intellectual task is approached without interest and with decreased attention, perception and comprehension. Neurological signs are frequently prominent. The superficial and deep reflexes are usually diminished or absent (infrequently certain tendon reflexes may be increased). The pupils are usually dilated and react sluggishly to light and in accommodation. Double vision and diminution of convergence may occur. Thickness and slurring of speech is frequently noted. The facial musculature may be flaccid and the face expressionless.

Tremors of the extremities and tongue are frequent. Sensibility to pain and touch is diminished.

In advanced intoxication all the previously described symptoms are exaggerated. The patient may be stuporous and aroused with difficulty. He appears seriously ill. Under these circumstances a fatal termination is not unusual.

The psychoses associated with bromide intoxication are protean in their manifestations. Frequently the first sign of an impending psychotic complication is a transition from a favorable sedative effect to a state of irritable restlessness and increased tension. This may then change to a dream-like state characterized by strange and terrifying hallucinations. Delirious reactions with marked confusion and physical toxicity may also occur. Some patients show a marked excitement with elation suggesting either a manic disorder or excited general paresis. Still others may show disordered thought, dullness, memory disturbances, and slowing of psychomotor processes suggesting an organic dementia.

Skin complications consisting of discrete pustules closely resembling acne vulgaris or more rarely elevated plaques or fungating lesions have long been considered a cardinal warning sign of bromide intoxication. More recent reports, however, emphasize the fact that the "bromide rash" is very frequently absent in extremely severe intoxications. The skin lesions may appear in some individuals with a low concentration of bromide in the blood, while others with high concentration may have no skin complications. Craven and Lancaster[3,4] reported fifty cases of bromide intoxication but only two had a skin rash. Curran[6] found only nine cases with skin complications in a series of fifty cases of bromide psychosis. Other authors[1,2,8,11,12] have also reported a low incidence of skin rash in cases with other evidence of bromide intoxication and a high bromide concentration in the blood. It is therefore dangerous to wait for the appearance of a rash as an indicator of bromide intoxication.

Threshold of Bromide Intoxication

The concentration of blood bromide necessary to produce toxic symptoms varies and it is impossible to set a universal toxic threshold. Katzenelbogen et al[9] experimentally achieved levels of 315 mg. and 385 mg. of bromide per 100 c.c. of blood without clinical symptoms. Others have observed severe mental disturbances with bromide concentrations of 150 mg. and less.

The susceptibility to mental symptoms from bromide ingestion (just as with alcohol or other intoxicating drug) appears to be dependent on the integrity of the central nervous system and on the degree of psychic integration and stability. Psychological symptoms are apt to appear very early in those individuals whose psychic reserve is low as the result of organic changes in the brain (hypertension, cerebral arteriosclerosis, senility) or acute intoxications of the nervous system (endogenous toxemia, acute infections, alcohol, et cetera).

The level of blood bromide concentration compatible with mental health is dependent on the general physical and psychic condition of the patient. In view of the importance of the personal factor it is hazardous to set a level of blood concentration of bromide at which symptoms of intoxication are apt to occur but Barbour et al[2] have empirically arrived at the following conclusions: If the blood concentration of bromide is below 100 mg. per 100 c.c. it can be safely ignored in young, healthy individuals. Amounts between 100 mg. and 200 mg. per 100 c.c. are likely to produce symptoms in elderly individuals with impaired cardiovascular-renal systems. When the concentration is above 200 mg. per 100 c.c. of blood, symptoms of intoxication usually become apparent.

Frequency of Bromide Intoxication

Bromide administration (either by self-medication or by physician's prescription) resulting in toxic manifestations occurs much more frequently than is generally recognized. Wuth[14] reported that in 238 consecutive admissions to a psychiatric service 21 per cent of patients had received bromide and that twenty of these showed evidence of intoxication. Diethelm[7] found in consecutive admissions to the same clinic for a period of ten months that 40 per cent of patients had taken some bromide and 2 per cent had toxic symptoms. Wagner and Bunbury[12] studied 1,000 consecutive admissions to the Colorado Psychopathic Hospital and discovered blood bromide concentrations over 75 mg. per 100 c.c. in 7.7

per cent of patients. Of these thirty-three had received the drug on a physician's prescription, fourteen from patent medicine and in thirty cases the source was undetermined. In England, Barbour[1] reported a series of fifty consecutive admissions with 78 per cent having bromide in the blood, four of these with more than 175 mg. per 100 c.c. Barbour et al[2] analyzed 400 physicians' prescriptions and found that one of every seven prescriptions contained bromide as the chief ingredient. This would mean that in England 8,000,000 prescriptions per year had a bromide as the principal ingredient.

In order to determine the incidence of bromide in the blood of patients presenting themselves for medical care, blood bromide determinations were made on 2,000 consecutive admissions to the University Hospital. An effort was made to approximate the conditions of general practice by making routine examinations on every patient over fourteen years of age regardless of the presenting complaint or the clinic to which the patient had been assigned. We feel that this is a fairly accurate cross-section of patients who might come to a physician's office. These studies revealed a blood bromide concentration above 25 mg. per 100 c.c. in 132 cases (6.6 per cent); in thirty-seven cases the blood bromide was above 75 mg. and in 15 cases above 100 mg.

Illustrative Case Reports

Cases with Low Psychic Reserve

Some patients with bromide intoxication show only mental hebetude and dulness with predominating physical and neurological signs, while others appear particularly susceptible to mental disorders. This predisposition to psychoses depends upon a number of variable factors and important among these are psychological stability and personality integration. These factors may show marked variations depending on the general state of health, the life situation and the psychological load the individual is carrying. The inherent emotional stability and the presence or absence of organic disease of the brain is likewise important. In general, it may be stated that any of these factors may reduce the psychic reserve and resistance to mental disease to such a degree that even a mild bromide intoxication will precipitate a psychosis. Individuals with mild mental disorders, organic brain syndromes or with basically neurotic personalities must be considered as already in precarious balance and potentially intoxicating drugs such as bromides should be used with great caution.

The following case demonstrates the effects of heavy sedation in a neurotic, emotionally immature girl. By reason of her unstable personality and numerous psychic conflicts, she had a very narrow margin of safety and was readily carried over into a psychotic reaction by the accumulation of bromides.

Case 1.—J. M. C., a white, single girl, aged eighteen years, was admitted to the hospital because of hallucinations, and delusions that the family were poisoning her food and repeated episodes of attempted truancy from home.

The family history was essentially negative. In personality the patient has been a wilful, spoiled girl who was emotionally immature and unstable. At the age of four years she developed strabismus and the parents satisfied her every wish to compensate for her disability. She became extremely dependent, demanded constant attention and had temper tantrums when her wishes were opposed. Following her father's death she became even more suspicious, feigned illness, went with undesirable men and truanted from home. Because of alleged abdominal pain and vomiting, she was taken to a hospital and sedatives were administered for her nervousness. While in the hospital she became unclear, believed that efforts were being made by other patients to annoy and persecute her, saw horrible animals and reptiles on the wall and attempted to jump out of the second story window to escape her persecutors. At times imaginary voices spoke to her and she became suspicious that efforts were being made to put poison in her food. Her speech became slurred and she could not speak in a coherent, connected manner.

On admission to this hospital it was noted that the pupils were widely dilated, gait was unsteady, the tendon reflexes hyperactive and there were nystagmoid movements of the eyes. There was a marked acneform eruption over the face and upper thorax. The blood bromide concentration was 325 mg. per 100 c.c. She was confused, disoriented and unable to give logical or relevant answers, stating that her mind was not working right and she could not think. There was marked impairment of judgment, thinking and reasoning and she was unable to understand what was happening about her. After thirty-two days the bromide concentration fell to 40 mg. per 100 c.c. and she was no longer confused or bewildered and regarded her previous beliefs with amusement. Further examination and therapeutic efforts after the acute toxic psychosis had passed revealed that there was a marked disturbance of personality and character by reason of the faulty early training, but there were no residual effects of the bromide intoxication.

The presence of mild mental disorders indicates that the psychic reserve has been reduced to a minimum and that abnormal impulses, emotions and thoughts are not

fully under volitional control. In these cases bromide salts are frequently prescribed and may at first appear to produce relaxation and relief. However, when there is beginning accumulation of the drug this temporary benefit disappears and is replaced by an exaggeration of the pre-existing mental disorder with the addition of severe anxiety, restlessness and confusion. This means that the patient's already depleted self-control and integration have been further impaired by the intoxicating process and that the patient is no longer able to exercise any volitional control over the underlying mental abnormalities. The result is usually increased activity and excitement for which larger doses of bromide are administered and this vicious cycle is continued until a mild delirium or a profound stupor ensues. The same chain of events may occur in general hospitals when efforts are made to control these patients by haphazard bromide sedation, the drug being administered indefinitely on the ever-dangerous "continued order" or given at the nurse's discretion on a "pro re nata order." This is illustrated by the following case:

Case 2.—M. N., a white married woman, aged thirty-four, was admitted to a general hospital service because no arrangements could be made for psychiatric care. The family history revealed many nervous and mental disorders. The past history of the patient was essentially negative except for prolonged worry over the family history of mental instability and some dissatisfaction because of marital disharmony. Six months before admission, the patient became more nervous and tensional and during the ensuing months this deepened into a depression. Her regular physician prescribed "nerve medicine and pain pills" and shortly before admission she became somewhat confused and unclear at times and believed she had committed great sins.

After admission to the general hospital the patient was restless, nervous and tensional and sodium bromide gr. XX t.i.d. was prescribed for three days. At the end of this time she had become more depressed and agitated. The sodium bromide was, therefore, continued at the rate of gr. XV t.i.d. This drug was then administered on a "continued order" for twenty-six days because her condition became worse and it was hoped that further sedation would control her until admission to a psychiatric hospital could be arranged. After several days of medication it was noted that an acneform eruption appeared over the face and upper thorax.

Her mental disturbance increased, suicidal efforts were frequent and episodes of confused, drowsy restlessness were noted. It became necessary to supplement the bromide by interval doses of paraldehyde. The patient became disoriented, bewildered and resistive to care and after a prolonged delirious episode she developed bronchopneumonia. During her hospital residence of thirty-nine days she had received at least 1,265 grs. of sodium bromide in addition to other sedatives.

On admission to the psychiatric unit the patient showed physical evidence of toxicity due to bronchopneumonia and some other factor. There was a slight acne over the face and shoulders. The concentration of bromides was 230 mg. per 100 c.c. of blood. She appeared dazed and confused, heard voices talking to her and saw horrible animals about the ward. A diagnosis was made of "acute toxic bromide psychosis superimposed on pre-existing depression."

Patients with organic brain syndromes present a similar susceptibility to delirious reactions associated with even mild intoxications. The impairment of their intellectual functions and the diminution of emotional control reduces their margin of psychic safety to such a degree that moderate states of bromism are sufficient to cause confused, excited psychotic episodes. Such a mental disorder was inadvertently produced in the following case:

Case 3.—B. K., a white woman, aged fifty-nine, was admitted to the hospital because of depressive reactions and suicidal attempts. She had always been a neurotic, unstable individual and had become depressed recently because of her advancing years and a fear of dependency. On admission she was tense, uncertain and attempted to hide her apprehension by forced humor and laughter. Physical examination revealed emaciation, marked physical weakness and evidence of mild generalized arteriosclerosis. The blood was negative for bromides. Psychological examination revealed mild organic brain disease with some intellectual deterioration.

An attempt was made to measure the permeability of the choroid plexus by the administration of sodium bromide gr. XV for five days. On the fifth day her mental symptoms underwent a marked change. She became extremely confused, alternately wept and laughed, heard imaginary voices threatening her and showed marked disorganization of thought. Aphasia and apraxia were noted during the following days. She confabulated extensively and told various bizarre stories concerning her vivid hallucinations and events at the hospital. Her gait was weak and staggering and she moved about in an aimless and restless manner. The bromide administration was stopped immediately and after eight days these striking symptoms disappeared, leaving only the pre-existing mild organic deterioration.

Cases with High Bromide Concentration Due to Cardiovascular-Renal Disorders

Frequently bromides are employed as a sedative measure in hard-driving, excitable individuals, especially in states of nervous tension following periods of excessive social activity or in overworked business executives. This type of individual frequently has an impaired cardiovascular system and bromides accumulate quickly in the blood whenever this system is disordered. For this reason, even small doses may soon cause a bromide intoxication. The increased

restlessness and anxiety which is due to beginning toxicity is frequently misinterpreted as due to a continuation of the original nervous tensional state and the drug administration is maintained with the ultimate production of severe intoxication, as is shown in the following case:

Case 4.—K. R., a white, married woman, aged fifty-nine, was admitted to The Neuropsychiatric Institute because of mental confusion, visions in which she saw herself tortured and delusions of marital infidelity.

The family history includes numerous instances of nervous, excitable individuals. The patient had been a woman of tremendous energy drive, had had numerous social interests and had been a community leader. She had been easily excited, tensional and nervous and always throwing herself into some activity. For the past one and one-half years she had received medical attention for hypertension. In the spring of 1938 she took on added social responsibilities and became exhausted and nervous and was given sedative medication. She soon became confused, believed her husband unfaithful, thought that neighbors were interfering in her family affairs and complained of dizziness and of seeing horrible visions. Her sleep was disturbed, she became restless and unable to relax and it was noted that her gait was staggering. On admission the patient was toxic and dehydrated, the only other positive physical findings being hypertension (162/110) and hypertensive heart disease. The blood bromide concentration was 410 mg. per 100 c.c. of blood. She was extremely confused, talked continually in a disconnected manner with marked slurring of speech and gave irrelevant answers. Occasionally she wept because she had been persecuted and her husband wanted to get rid of her. She was completely disoriented and could not understand why she was in a hospital. There was marked impairment of all intellectual functions.

For the next several days she continued to have vivid auditory hallucinations, numerous delusions of persecution and episodes of violent motor activity. The excitement was controlled by hydrotherapy and sodium chloride administered to hasten the bromide elimination. At the end of seventeen days the blood bromide level had fallen to 150 mg. per 100 c.c. and she became more coöperative and in touch with her surroundings, except for infrequent periods of mild confusion. She was discharged thirty-two days after admission as recovered from the acute psychosis and with complete insight into her mental disorder. There remained some excitability, talkativeness and emotional lability which was considered a part of her usual personality.

Bromides are especially contra-indicated in patients with cardiovascular-renal insufficiency and consequent disturbances in the elimination of water. The healthy renal epithelium eliminates bromides slowly and when for any reason the kidney function is impaired there is a rapid accumulation of bromide in toxic quantities in the various tissue fluids. If large quantities of fluid are then discharged from the body and the kidney is unable to excrete a proportional amount of bromide there may occur a sudden and toxic concentration in the blood with signs of intoxication as shown in the following case:

Case 5.—M. B., a white woman, aged forty-seven, was admitted to the Department of Internal Medicine because of shortness of breath. Fifteen years before she had had rheumatic fever and five years ago noted dyspnea on exertion which gradually became more severe until five months before admission there was progressive orthopnea and cyanosis. Shortly before admission her abdomen and ankles began to swell. She had been receiving a pink liquid medicine.

Examination revealed a well nourished woman who was orthopneic, cyanotic and mentally slowed and dull. There was generalized pitting edema. Cardiac examination revealed an enlarged heart, mitral stenosis, auricular fibrillation and congestive heart failure. Laboratory studies were essentially negative, except for a bromide concentration of 175 mg. per 100 c.c. of blood.

Two days after admission she received 1 c.c. of an intravenous mercurial diuretic and the urinary output became 3,550 c.c. and the intake only 1,120 c.c. with a marked decrease in the edema. It was noted that she was drowsy, slept a great deal and that night she was found wandering aimlessly about the ward. During the next few days there was a further decrease in edema, but a rapid increase in the mental symptoms. She became very confused and uncoöperative, wandered aimlessly about the hospital whenever she could escape the nurses and believed that efforts were being made to harm her. She maintained that members of the hospital personnel were attempting to chloroform her, that other patients were whispering about her and that she could see peculiar things happening on the ward. Her conversation was rambling and disjointed. The confusion and the delusional ideas partially disappeared on the sixth day after the diuresis, but she insisted on leaving against advice. Re-examination twenty days later failed to reveal any residual mental symptoms.

Cases Occurring Postoperatively

The period of convalescence from surgical procedures is frequently characterized by extreme nervousness and emotional instability. Bromides are often prescribed to alleviate these symptoms and to aid the patient in obtaining the necessary rest and relaxation. It must be remembered, however, that the postoperative patient has had a severe psychological trauma and may have markedly diminished psychic reserve and stability for several months. In addition, there often are prolonged postoperative physiological derangements which may predispose to bromide accumulation. These factors increase the danger of mental disorder associated with bromism even when small doses of the drug are used. Frequently such patients may augment the physician's sedation by proprietary sedative

preparations suggested by some friend. Such a train of events is demonstrated in the following case:

Case 6.—A. F., a white, married woman, aged forty-eight, was admitted to The Neuropsychiatric Institute because of confusion, depression and suicidal attempts. The past medical history is essentially negative except for two thyroid operations, the last occurring eleven years before this admission. In personality, she has been considered to be conscientious, frank, and emotionally stable.

Seven months prior to admission a pan-hysterectomy had been performed because of menorrhagia. The postoperative course was uneventful, but on return home she was nervous, tense, felt exhausted and feared that she had a serious cardiac disorder. Four months before admission to The Institute sedatives were prescribed and for a time she slept better, was more composed and less fearful. During this time she apparently took large quantities of a proprietary preparation containing sodium, ammonium and postassium bromides, apparently without the family's knowledge. After one month she became increasingly irritable and was depressed and frequently wept. Her behavior became increasingly impulsive and violent episodes were more frequent. One week before admission she attempted suicide.

On admission the general physical condition was good. There was an acneform eruption over the face and upper thorax which had only been present since the onset of the present illness. The blood bromide concentration was 270 milligrams per 100 c.c.

Psychiatric examination revealed the patient to be confused, disoriented, rambling and incoherent in her conversation and there was marked slurring of speech. She appeared fearful and bewildered, having been terrified by horrible and vivid visual hallucinations. There was marked interference with memory, thinking and judgment. Within three weeks the blood bromide concentration had fallen to 75 milligrams per 100 c.c. and the confusion, hallucinosis and depression had largely disappeared. There were a few residual symptoms, including occasional fearfulness, mild confusion and concern regarding her physical condition. These symptoms soon disappeared under further treatment and the patient was discharged from the hospital seven weeks after admission, at which time she was stable, composed and had no fears regarding her physical or mental condition.

Cases Associated with the Menopause

Nervous manifestations frequently occur at the menopause. During this period women appear to be especially vulnerable to mental disorders and great care must be exercised that their emotional imbalance is not further exaggerated by ill-advised medication. In the treatment of the menopausal syndrome, bromides have been extensively employed and in controlled dosages have been beneficial. In some cases, the patient may become discouraged because immediate improvement is not apparent and surreptitiously increase the dosage of the medicine. In other cases they may even secretly consult another physician, who, not knowing the patient has been receiving sedation, may also prescribe bromides.

Case 7.—M. K., a white, married woman, aged forty-five, was admitted to The Neuropsychiatric Institute because of confusion, excitement, auditory and visual hallucinations. The past medical history was negative except for hypertension and previous amputation of both breasts for suspected cancer. In personality make-up the patient was considered to be cold, stubborn and unstable.

Several months before admission the patient became irritable, tearful and tensional, these symptoms being attributed to the menopause. Three months before admission she consulted a physician and received ovarian extract and a liquid medicine. After taking a considerable quantity of the liquid medicine, her symptoms became worse and she complained that words ran together when she attempted to read, outbursts of weeping became prominent associated with voiced suspicion of her husband's fidelity. When her condition became worse she was taken to another physician, who prescribed further sedation. Her confusion rapidly became more severe and the patient stated that she saw Indians in the house, horrible animals on the wall threatening her, and aeroplanes surrounding the house. At times she did not recognize members of the family. Imaginary voices constantly threatened her and insulted her character. She became more restless, excitable and fearful and the sedation was increased. Her voice became thick, her words slurred, her movements awkward and she was unable to judge distance or direction. There were complaints of blurring of vision and occasional body tremors were noted, and for the several days prior to admission the patient was semi-stuporous most of the time and she "acted just like a drunken person."

Physical examination was negative except for surgical scars and mild essential hypertension. The skin was clear and no eruptions were noted. The blood bromide concentration was 250 milligrams per 100 c.c.

Psychiatric examination showed her to be confused, bewildered, subject to auditory and visual hallucinations and restless and apprehensive in her general behavior. She frequently saw horrible animals about the hospital, heard voices threatening her constantly and was extremely resistive, believing that harm was to be done to her.

During the next five weeks there was a gradual decrease in the restlessless, confusion and hallucinosis and a return to her normal behavior. After the acute intoxication had passed she again was composed and sensible, her only residual symptoms being some tension and worry over her physical condition.

Cases Due to Self-Medication

The widespread practice of self-diagnosis of nervous conditions, headaches and "neuralgia" and the subsequent self-medication with various patent medicines is a frequent source of bromide intoxication. Many of these proprietary preparations contain bromide salts as the sedative principle in amounts sufficient to produce toxic states after prolonged or excessive use. These preparations are often taken indiscriminate-

ly by the laity in the mistaken belief that they might possibly help, and at least that they can do no harm. The usual history shows progressively heavier dosage to combat increasing nervousness, and with the onset of mental confusion the patient loses all reason and judgment regarding dosage and frequency and often takes tremendous amounts. When these patients finally come to the physician they present a bewildering medley of physical and mental symptoms, the diagnosis of which may be obscure unless the sedative history is elicited or the bromide detected by laboratory tests. In some cases the sedative addiction is concealed from the physician or is unknown to the relatives and the physician may innocently precipitate the final breakdown by prescribing bromides for the patient's obvious nervousness. The following is a case of self-induced bromide intoxication, the diagnosis of which was very puzzling because of a negative drug history:

Case 8.—J. B., a white woman, aged forty-six, was brought to The Neuropsychiatric Institute when her family noted that she was confused, unable to complete her sentences and often fell asleep while talking or doing household tasks. The family history was essentially negative. The patient had always been an unstable, tensional, hypochondriacal individual and two and one-half years ago had had a sub-total thyroidectomy because of nervousness.

For the past two years, because of domestic problems, she had been more nervous, had daily headaches and had remained away from the rest of the family, complaining of numerous symptoms. During this time she had been receiving thyroid substance because of possible thyroid deficiency. Three weeks before admission she was found sleeping on the floor.

On admission she was found to be confused and semi-stuporous and fell asleep during the physical examination. There were no positive physical findings and the blood sugar, nonprotein-nitrogen and blood cholesterol were within normal limits. The basal metabolic rate was —5 per cent. She was extremely bewildered, had numerous auditory and visual hallucinations, and believed that the hospital room was a remodeled room in her home. At times she was fearful and depressed and at other times was quite irritable. There was marked interference with all intellectual processes.

The family were questioned and denied that she had taken any drugs or medicine. Because of the hebetude and weakness, her condition was first considered to be hypothyroidism but studies failed to confirm this impression. Nine days after admission (a drug-free period) the bromide concentration was found to be 400 mg. per 100 c.c. of blood. When the family were confronted with this finding they admitted that because of headaches she had been taking about one and a half bottles of a widely advertised proprietary analgesic per week, but they had not mentioned this because they had not considered it a drug or medicine.

After two weeks the mental symptoms of bromide intoxication had passed and the bromide concentration fell rapidly under elimination treatment. There were no residual symptoms from the acute intoxication but the patient still presented the same unstable, hypochondriacal personality which existed before the complicating toxic psychosis.

Summary

The purpose of this report is not to discredit the rational use of bromides or to minimize their possible benefits. The beneficial effects of the drugs, when correctly used, are recognized, but it is necessary to emphasize that there is an equal potentiality for harm when they are given injudiciously. Even in suitable cases these drugs tend to accumulate after prolonged administration and the blood concentration may soon exceed the safe level of approximately 125 mg. per 100 c.c. The physician must carefully select cases for bromide administration and insist upon an adequate fluid intake and sufficient chlorides (at least 15 grams of chlorides per day are necessary[14] when the sodium bromide intake is 45 grains per day).

The physician must also be alert to the possibility that the patient may have already received large quantities of bromide from a previous physician or by self-medication. For this reason, these drugs should never be prescribed without careful inquiry into the history of medication. Even this precautionary measure is not always reliable and if there is the slightest evidence in the history or clinical examination of previous bromide ingestion, it is imperative to make a chemical examination of the blood or urine. This can easily be done by the method of Belote, who has described a simple laboratory test for the presence of bromides in body fluids such as urine, blood, saliva, sweat, gastric contents and spinal fluid. The test depends on the transformation of fluorescein into eosin when bromine is added to the former. The test is as follows: "Small strips of filter paper are soaked in a saturated solution of fluorescein in 60 per cent acetic acid. These are then allowed to dry and may be kept indefinitely as indicators of the test. The suspected body fluid is placed in a test tube. To this are added a few crystals of potassium permanganate. After agitation, a few drops of concentrated sulphuric acid are added and the fluorescein paper is held, after moistening with 2 per cent acetic acid, at the

mouth of the test tube. The presence of even minute amounts of bromine is at once indicated by a rapid change in color from the original yellow to a bright pink on the paper. The presence of chlorine and iodine in no way interferes with the detection of bromine in this test." If bromide is present, the blood concentration should be determined by the Hauptmann modification of Walters' method.[7] If these precautionary measures are carefully observed we feel that bromide therapy is valuable when mild sedation is necessary. Bromide therapy should never be used as placebo medication.

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FEDERAL AND STATE COÖPERATION IN MATERNAL AND CHILD HEALTH*

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Twenty years ago the Children's Bureau of the United States Department of Labor, with the assistance of some 11,000,000 women organized under the auspices of the Women's Committee of the Council of National Defense, was engaged in a great "Children's Year" campaign under the slogan "The Health of the Child is the Power of the Nation." One year earlier, in 1917, the first Chief of the Children's Bureau, Julia C. Lathrop, had proposed a public program for maternity and infancy, resting upon the principle of Federal coöperation with the states, which had been well established in certain other fields, notably Agriculture. The conception of the need for a nation-wide program for safeguarding the lives and health of mothers and children grew out of the work of the Children's Bureau, which was established in 1912 as an agency for gathering information concerning conditions affecting child life and disseminating it throughout the country. Authorized to "investigate and report * * * upon all matters pertaining to the welfare of children and child life among all classes of our people," the new Bureau set to work, making carefully conducted studies of maternal and infant mortality; issuing popular bulletins on prenatal care, infant care, and child care, prepared with the advice and under the direction of obstetricians and pediatricians of national standing; and coöperating with state and local agencies, private organizations, and professional and lay groups concerned with advancing the health and safeguarding the well-being of the American child. Almost from the first, the activities of the Children's Bureau in the field of child health were directed by physicians.

During the period from 1921 to 1929, a beginning was made in direct Federal cooperation with the states, with Federal aid, in promoting the health of mothers and babies, but the work was interrupted by the termination of the Sheppard-Towner Act in 1929. When the Social Security Act was in preparation, the Children's Bureau, with the assistance of technical advisory committees on which the medical profession was represented, assembled the basic information and prepared plans for Federal aid to the states for extending and strengthening ma-

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ternal and child health services; services to crippled children; and child welfare services for the protection and care of homeless, dependent and neglected children and children in danger of becoming delinquent. These proposals, after consideration by the Cabinet Committee on Economic Security and by committees of Congress, were incorporated in title V, parts 1, 2, and 3, of the Social Security Act. Authorization of Federal aid to the states for general public health purposes was incorporated in title VI of the Act.

Responsibility for Federal administration of title V, parts 1, 2, and 3, is placed in the Children's Bureau. The United States Public Health Service administers title VI. Through informal contacts between the staffs of the two agencies, and through technical committees of the Interdepartmental Committee to Coördinate Health and Welfare Activities, very substantial agreement as to policies governing the relationships of the two Federal agencies with the state agencies responsible for the health and welfare aspects of the social security program has been reached. Similar coöperation has been worked out between the Children's Bureau and the Social Security Board, especially with reference to the child-welfare service program authorized in title V, part 3, administered by the Children's Bureau, and the program of aid to dependent children authorized by title IV, administered by the Social Security Board. Representatives of the three agencies, namely, the Public Health Service, the Children's Bureau, and the Social Security Board, served as the technical committee which developed the recommendations for a national health program approved by the Interdepartmental Committee to Coördinate Health and Welfare Activities, and presented to the National Health Conference held in Washington last July.

The programs of Federal aid for maternal and child health and general public health services represent for the most part an expansion in functions of health education and preventive health service long recognized as within the field of public health organization. The program of services for crippled children is the first program of Federal aid to the states for medical, surgical, and hospital care to be authorized. Michigan, of course, is especially interested in this part of the Social Security Act because of the pioneer work, begun in 1913, under the Michigan Afflicted Children and Crippled Children's Acts. Experience in crippled children's services, as well as in maternal and child-health and general public-health services, furnishes many clues of importance in planning more comprehensive programs of health service and medical care. Among the subjects which are of particular interest in this connection, which I shall discuss with reference to experience in Federal cooperation with the states for maternal and child health and crippled children's services, are the following:

1. Medical direction, medical staff, and technical advisory service.
2. Federal-state relationships.
3. Personnel standards.
4. Relationships with medical practitioners and with public and private hospitals.
5. Extending, strengthening, and broadening programs of service.

I shall take up these points seriatim.

1. *Medical direction, medical staff, and technical advisory service.*—In the Children's Bureau, general responsibility for formulating and carrying out policies and recruiting personnel for the divisions of the Bureau carrying on health work rests with the Assistant Chief, Dr. Martha M. Eliot, a pediatrician formerly on the faculty of Yale University School of Medicine. The research work of the Bureau in health fields is carried on principally by the Division of Research in Child Development, whose Director, Dr. Ethel C. Dunham, also a pediatrician, was likewise on the Yale faculty. Responsibility for administration of Federal aid to the states under title V, part 1, is vested in the Division of Maternal and Child Health, whose Director, Dr. Edwin F. Daily, is a Diplomate of the American Board of Obstetricians and Gynecologists and was formerly associated with Dr. Fred L. Adair on the medical faculty of the University of Chicago. The Crippled Children's Division, administering title V, part 2, is under the direction of Dr. Robert C. Hood, a pediatrician formerly an instructor in pediatrics at the University of Cincinnati and later engaged in private practice. Members of a medical staff of obstetricians, pediatricians, part-time consultant orthopedic surgeons, and physicians with experience in

public-health administration, serve as assistant directors of divisions, experts, and regional medical consultants. Advisory and consultant service for public-health nursing, medical social work, and nutrition is given by specialists in these fields. General and advisory committees with professional representation from various fields assist the Bureau in the development of general policies.

Forty-eight states, Alaska, Hawaii, and the District of Columbia coöperate with the Children's Bureau in Federally aided maternal and child-health services. In every case, by the terms of the Act, responsibility is vested in the State health department. In each state, immediate responsibility for the program is vested in a Division of Maternal and Child Health whose full-time director is a physician, nearly always one having special experience in obstetrics, pediatrics, or public-health administration.

Review of the state maternal and child health plans for the current fiscal year shows that in 22 states maternal and child-health medical advisory committees have been appointed which are the maternal and child-health committees of the state medical societies or the state maternal-welfare committees. Ten of these twenty-two states and twenty-eight other states have one or more physicians on the general maternal and child-health advisory committee.

The Federal Act recognizes for the administration of services to crippled children whatever state agency is vested with responsibility by state law for such work. Since the act went into effect there has been a marked trend toward placing responsibility for this medical care program in the health department. At the present time, of the fifty states and territories coöperating under the Crippled Children's program, twenty-four administer crippled children's programs through the health department, fifteen through the welfare department, five through a crippled children's commission, and six through some other agency.

The state and territorial health officers have recommended that the director of the crippled children's program should be a physician, preferably one experienced in the care of crippled children, and the Children's Bureau in its consultant service to the states emphasizes the importance of such direction. At present, crippled children's services in thirty-one states have a full-time or part-time medical director who is the executive in charge of the service. This represents an increase of eight states with medical directors in a period of one year. In addition, physicians have acted as full-time or part-time assistant directors in five states. Technical advisory committees, on which orthopedic surgeons and representatives of other medical specialties are represented, are utilized in thirty-three states. In other states the medical profession is represented on a general advisory committee.

2. *Federal-State relationships.*—It is the essence of the federal aid programs carried on under the Social Security Act, that the program within each state should be initiated, developed and administered or supervised by a single state agency clothed with effective authority and staffed by competent personnel. Subject to the very general requirements of the act, it is for the state agency to decide the particular character of the program which in its judgment is best adapted to serve the mothers and children of the state. The policy of the Children's Bureau is to bring to each state agency, through conferences, printed material, and consultant services, full information as to experience and developments throughout the country, and to encourage each state to build its own program in the light of its own needs and resources and with the advice of organized professional groups within the state. Hence, the programs vary widely from state to state, though all must be directed toward the accomplishment of the general objectives of the act.

Annual plans and budgets prepared by the state agency are reviewed by the Children's Bureau to determine whether they are in conformity with the requirements of the act. These requirements for the most part are the same for the maternal and child health and crippled children's services. For both are required:

1. Financial participation by the state.
2. Administration or supervision of administration by a single state agency.
3. Methods of administration (with certain exceptions as to personnel) necessary for the efficient operation of the plan.
4. Reports to the Secretary of Labor.
5. Coöperation with medical, nursing, and welfare groups and organizations,

and, in the case of crippled children, with the agency charged with vocational rehabilitation.

In addition, maternal and child health plans must provide for extension and improvement of local maternal and child-health services and for development of demonstration services in needy areas and among groups in special need. Plans for crippled children must provide for locating crippled children and for furnishing medical, surgical, corrective, and other services and care, and facilities for diagnosis, hospitalization, and aftercare, for children who are crippled or who are suffering from conditions which lead to crippling.

3. *Personnel standards.*—Although no Federal regulations regarding personnel standards have been issued, reliance has been placed very largely by the states, and by the Children's Bureau in its consultation service to the states, on standards drawn up by the advisory committees to the Children's Bureau, the organization of state and territorial health officers, and various professional organizations and specialty boards. The majority of the states have made every effort to secure qualified personnel for new appointments and to provide additional training through stipends for postgraduate study for those not fully trained. A review of state plans for crippled children's services for the fiscal year 1938 showed that the standards of recognized national professional organizations were taken into consideration by state agencies in the selection of personnel as follows: Surgeons, twenty-four states; registered nurses, sixteen states; medical social workers, nineteen states; and physical-therapy technicians, twenty states.

4. *Relationships with medical practitioners and with public and private hospitals.*—Encouraging progress has been made in developing mutual understanding between the staffs of the state health agencies and the practicing physicians in areas where activities are planned or in progress. Such progress was to be expected, since both groups have the objective of improving the health of mothers and children. In 1937, the official state health agencies in thirty-five states have aided in the establishment of prenatal clinics and child health conferences, which are being conducted in forty-two states. As a rule, local practicing physicians have participated in these conferences and have been paid for their services. In 1937, more than 2,500 local practicing physicians were paid for services in such clinics and conferences. Postgraduate lecture courses in obstetrics for local practicing physicians were held in 316 centers in thirty-two states in the fiscal year 1937, and were attended by over 8,000 physicians. Postgraduate lecture courses in pediatrics were attended by more than 6,000 physicians in 243 centers in twenty-six states. In 1938, seven states provided postgraduate courses for local physicians in the early recognition and treatment of crippling conditions. The Michigan program includes orthopedic refresher courses or clinics established and conducted under coöperative procedures developed by the Crippled Children's Commission, the State Medical Society, and the Postgraduate School of Medicine of the University of Michigan.

Other assistance to local practicing physicians includes provision of obstetric or pediatric consultation service in areas where this had not been available, furnishing certain types of drugs or other supplies needed for maternal and child-health work, and providing nursing assistance for home deliveries in a number of areas. In a few places, physicians are being paid for obstetrical-delivery service for needy mothers.

Funds available under the maternal and child-health program are so limited that their use for payment of hospital costs has not been authorized. Proposals for expanding the program to include payment of medical and nursing care at delivery for mothers who cannot procure such care for economic or other reasons include provisions for payment of hospital costs in emergency cases.

Hospitalization is an item of major importance in the crippled children's program. Plans for the fiscal year 1939 show a total of $2,219,113.30 budgeted for hospital care from federal, state or local funds, representing 40.5 per cent of the total funds budgeted.

The program of services for crippled children in most of the states has made it possible to utilize additional hospitals, both public and private, on a purchase-of-care basis, and so to bring hospital care nearer the child's home. State plans for 1939 showed 592 hospitals approved by state agencies for the care of crippled children.

Of these, eighty-seven were public hospitals and 505 were private hospitals. Michigan is included in a group of ten states that have made extensive provision for decentralization of hospital service.

Questions of fee schedules for physicians and surgeons and schedules of rates for hospital care have presented many difficulties in the crippled children's program, but in most states marked progress has been made in the direction of developing, with the aid of professional advisory groups, schedules for fees and rates that afford, in some degree at least, reasonable compensation and do not absorb an undue proportion of the total cost of services essential to the complete rehabilitation of the crippled child.

In planning for the use of both public and private hospitals it has been necessary to safeguard the control of the state administrative agency with reference to general policies, particularly with reference to the admission and discharge of children and the general quality of hospital care, while at the same time preserving the full liberty of the technical staff of approved hospitals with reference to medical and surgical care.

Development of standards governing the approval of hospitals for service in the crippled children's program has been an important part of state plans. Recommendations made by the Children's Bureau's advisory committee on services for crippled children with respect to the selection of hospitals used for the care of crippled children have been of great assistance to the states in setting up standards for the selection of hospitals. With few exceptions, the hospitals which are being used by the state agencies for the treatment and care of crippled children are those that have been registered by the Council on Medical Education and Hospitals of the American Medical Association and that have been approved for surgical service by the American College of Surgeons. In addition to meeting the requirements of the American College of Surgeons, and the use of other criteria, such as registration by the American Medical Association and approval of the American Hospital Association, state agencies have utilized the recommendations of the Children's Bureau advisory committee; that is, that these hospitals have on their staffs qualified orthopedic surgeons, nurses, physical therapy technicians, and medical social workers, and have physical therapy equipment. Many hospitals have improved their equipment in order to give more adequate service to crippled children because of the increased number of children being referred to them by the state agency.

5. *Extending, strengthening, and broadening programs of service.*—Before the plans for services for crippled children under the Social Security Act were developed, in a number of states no state agency was provided for such services. In others, public funds were available for only one or two types of service, such as hospitalization, or hospitalization and diagnostic clinics. The coöperative program has been in operation less than three years, yet in that period of time much has been accomplished in extending the program to reach additional children and in providing more complete medical and social care for the children receiving service. Most of the states have made special efforts to solve the difficult problem of extending satisfactory aftercare services to children in rural areas. There has been a growing awareness in the states of the value and importance of meeting the needs of the child in his own home and his own community if possible.

Progress has been made in developing means of locating crippled children, including the use of birth certificates and epidemiological reports, and in building up state registers based on uniform procedures for recording and classifying cases. As of March 31, 1938, the total number of crippled children on the registers of forty-three states, Alaska, and Hawaii, was 130,610. Diagnostic clinics have been greatly extended and their services improved. Studies of intake and discharge policies and procedures have been made by the Children's Bureau in twelve states. In states where children were accepted for care through court commitment, as in Michigan, there was great variation in understanding of the meaning of commitment in terms of continuing parental responsibility, and in commitment procedures. Frequently, the judge had no information regarding the estimated costs of medical care, and only very meager medical and social information. Divided responsibility between courts and administrative agencies creates many difficulties and tends to hamper the development of sound administrative procedures.

Need for greatly expanded facilities for

convalescent care, either in convalescent homes or boarding homes, has been conclusively shown by the studies and by general experience. Aftercare of the crippled child through public-health nurses, medical supervision where needed, and social workers is a phase of the program which was almost entirely lacking in many states, but which is recognized now as of very great importance if the benefits of the expensive and prolonged care required in most cases are not to be neutralized, and in many instances lost, through lack of understanding of the child's needs by the parents and adverse conditions in the home. The importance of the medical social worker as a key person in the crippled children's program, who can help to mobilize the resources of the state or community for health care and social service both before and after hospitalization, is being stressed increasingly in the development of state programs.

Perhaps in no other type of service for children is there such a distinct need for correlation of all services affecting the program as in work for crippled children. The state agencies are utilizing extensively such state and local services by both public and private agencies. As state-wide programs of maternal and child health and social services, aided through title V, parts 1 and 3, of the Social Security Act, and through public-assistance provisions of the Act, become better established, it may be possible (a) to place upon state and local maternal and child-health services the major responsibility for locating and diagnosing crippled children, providing, in coöperation with the crippled children's service, expert consultation to determine medical and surgical need in every case where hospitalization or surgical care may be involved; (b) to place upon state and local public welfare agencies primary responsibility for determination of economic and social need, subject to review and final approval by the crippled children's services; (c) to place upon maternal and child-health services, especially public-health nurses, primary responsibility for aftercare, with special reference to home care and diet required by the child's physical needs, aided by physical therapists and other specialists on the staff of the crippled children's agency; (d) to place upon public-welfare services primary responsibility for such aftercare services as involve assistance in dealing with adverse home situations, aided by medical social workers on the staff of the crippled children's agency; and (e) to coöperate with the educational and vocational rehabilitation authorities in meeting the educational and vocational needs of the crippled child. To work out satisfactorily all these relationships, so that a complete program for meeting the needs of each crippled child, under the general supervision of the crippled children's agency, may be developed, is a major task in health and social planning and requires that the state agency be under competent and imaginative leadership and staffed with specialists who can serve as consultants and otherwise give leadership in the various fields of service, including medicine and surgery, public-health nursing, and medical social work.

Michigan, because of the length and breadth of its experience in caring for afflicted and crippled children, and the well-accepted responsibility of the state for providing care, has an opportunity to make an outstanding demonstration which will have great significance to the nation. Careful study should be made of the ways in which the state program may be strengthened and enriched, and its relationship to other public-health and social-work programs in the state may be further developed. As state and local welfare services are extended throughout the state, as provided in the legislation to be acted upon through referendum in November, trained social workers should be available in each county, who can assist in the determination of economic and social need. Review of the Michigan program indicates that the quality of medical service should be raised by adding consultation service, especially pediatric service, on a state-wide basis. Review of recommendations of local physicians by specialists, prior to acceptance for care or at the beginning of care, by the official state agency, should be extended throughout the state as urged by the medical profession, with the aim of providing the best quality of service at reasonable cost, requiring the shortest possible period of care away from home. The need of medical care in their homes for children not requiring hospitalization should be considered. Aftercare service to the child discharged from the hospital should be strengthened.

Upon the Michigan medical profession, whose devoted service throughout the years

has meant so much to the crippled and afflicted children of the state, and upon the people of Michigan who are concerned that all children suffering from physical handicaps and deformities should be restored, so far as possible, to the possibility of full and rich living, depends the further extension and development of a concept of public responsibility to human well-being that is rapidly receiving nation-wide acceptance.

OCCUPATIONAL HYGIENE IN MICHIGAN SIXTY-FIVE YEARS AGO*

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"A stump speaker enlarges his lungs by his vociferations, yet his windy harangues may bring on a bronchitis, which will stop his breathing in the end."

This quotation characterizes the terse and pungent language of the first known documentary publication in Michigan dealing with occupational diseases and industrial hygiene.

Michigan's Board of Health was created in 1873, with Dr. H. O. Hitchcock as president. The total expenditures for all the first year's endeavors amounted to $28.75. Early in its activities this board committed itself to the preparation of a detailed annual report. One member of this early board, a layman, Charles H. Brigham, of Ann Arbor, was charged with responsibilities as to the public health aspects of occupations. In 1875, he presented his first formal report which was published in the Board's annual record for that year.

In 1935, sixty years later, the State Department of Health for Michigan first created a separate unit division of Industrial Hygiene. In many quarters this was regarded as an "innovation," "revolutionary," "pioneering," "far-sighted,"—all overlooking the historic fact that this field was almost the very first to which the newly created Board of 1873 turned as a needed objective in its activities.

It is a cause for wonder that in those days of almost pre-industrial pursuits in Michigan so much wisdom was the lot of this prophetic writer and public health servant. With the deletion of only a few paragraphs, this publication might well be utilized today as a fighting plea for the better control of health exposures for industrial workers. In order that we may learn from the past and at the same time pay tribute to Michigan's pioneer industrial hygienist, various excerpts are now taken from this ancient public document:

"Individual men and women are rarely willing to allow that the calling which they have chosen is the cause of the disease which they may happen to have; and employers will insist that the health of their workmen is good, however dangerous their occupation may seem to be. The owner of a gunpowder mill will bring facts to show that his workmen are safer in their place than the laborers on a farm, and in proportion to their number fewer die violent death. The white lead manufacturer has figures to prove that his workmen are likely to live to a good old age. Interest and prejudice unite to underrate the risk and the disaster in one or another kind of labor. Circulars to factory owners about the health of their operatives, will bring back a very vague and uncertain report, if they get any answer at all; and questions on the spot are often treated as intrusive and meddlesome. There is no charge to which men are more sensitive, than even an implication, that in their work they are injuring their own health."

How different this day. Workers are prone to attribute every illness to work as the cause and cherish the hope that in any period of work idleness, some occupational disease may be the basis of income. Witness the avalanche of occupational disease claims during the depression years of the "thirties." Employers rarely "talk down" the possibility of health exposures in their plants. Manufacturers have knocked the scales off their eyes or had them knocked off until they see with clarity that industrial hygienic exposures may be realities. The viewpoint of the enterprising industrialist is commendable.

"Who can say what proportion of the malady comes from the kind of work and what proportion from other sources, bad surroundings, bad personal habits? The pains of the seamstress may come from her tight lacing more than from her much sewing; the headaches of the teacher from her late hours

*From the Industrial Health Conservancy Laboratories.

and loss of sleep quite as much as from her cares in the school room. Before we can draw satisfactory inferences from cases of ill health, we must know much more than the kind of occupation, we must know the antecedents and the general way of life, of men and women whose cases are reckoned; —where they live, who their parents were, what their methods and associations are. A work which is healthy enough in some places, may be very unhealthy in others. A scrivener, for instance, is robust in Naples, while he is pale and haggard in New York, for in the one city he writes in the open street, under the clear sunlight, and in the soft air from the sea, while in the other city, he is probably cooped in a dismal back attic, by the dim light of a narrow window with only poisoned air to breathe."

"The sewing girls of the cities ought to die much more rapidly than they do die, when one considers the character of their work bending over a machine fourteen or sixteen hours a day with no change of position."

In a new world, powered machines and eight hour work days leave these garment workers still so pretty as to appear in Broadway shows promoting garment makers unions—"Pins and Needles."

"No occupation in human life is absolutely free from danger to life and health. Some are healthier than others, but all have some vice which shows itself sooner or later. No calling is known to man which gives as it is ordinarily followed, just that balance of exercise to mind and body, to muscles, nerves, and physical functions which makes the state of perfect health. No occupation can be chosen in which there is perfect assurance of immunity from all the ills to which the flesh is heir. No one can prevent the inevitable issue of old age and death at last. These come in every calling."

Sixty-five years later, the bane to employers is the unwillingness of older workers to face the issue of decrepitude. To them old age is an occupational disease deserving compensation; senility is an "accident." Old age security and unemployment insurance may yet save the onslaughts of the broken down worker on the employer's compensation fund. Security for the aged is most desirable but this should not be procured through spurious claims for work diseases.

"It is impossible to make some trades healthy by any contrivance—such for instance, as knife-grinding and diamond cutting and soap boiling, and many more in which the peril to vital organs is direct and constant. A large number of the occupations of civilized life, important, indispensable, involve this constant danger, from which there is no escape, which belongs to the occupation. Cotton spinning, flour grinding, watch-making, shoemaking, lace-making, the trade of the painter, of the soldier, of the sailor, of the physician—how many trades of the highest need in social life are full of hazard to health and safety. It might almost be said that fully one-half of the various callings of civilized man, in the way they are carried on, are direct temptations to disease."

"The way they are carried on" has robbed many of these trades of their "temptations." Regrettable it is that this able observer for whom this is written in tribute sixty-five years later might not have known that in 1891, Acheson, a chemist, in Monongahela, Pennsylvania, seeking to make artificial diamonds by fusing clay and coke in a makeshift miniature electric furnace contrived from a plumber's solder pot, made not diamonds but a more priceless thing—carborundum, a synthetic abrasive destined to promote mass production in many ramifications, but in particular to liberate all "knife grinders," cutlery grinders, tool grinders from the ominous threat of silicosis—the great descimator of natural stone workers. The dusts of carborundum and emery are harmless as producers of significant dusty lung diseases. Silica dust as found in edge tool grinding has killed so many workers that no statement about it throughout this author's paper may be labeled as extravagant.

"There are some adjuncts of different kinds of labor which are always injurious, the harm of which cannot be argued away. Dust first and on the whole worst, which is the plague of more callings than any other. Dust is not healthy in any place or of any kind, whether it be in the potato patch, or woolen mill, or grist mill or iron mill, or a carriage on the highway. That kings and cardinals snuff the dust of tobacco does not rescue this aromatic powder from the common sentence. Dust is the omnipresent nuisance of labor."

"The powders which whiten clothing, and the dyes which enable fashionable women to show themselves gayer than lilies of the field, are wrought at the expense of human life."

"The clean work of the bleachery may become as fatal to health and strength as the foul work of the sewer. Chlorine is even more deadly in the sensitive air passages than fetid hydrogen (hydrogen sulfide?)"

"The fact that noxious odors after a time cease to be noticed, does not make them salutary, or neutralize their bad influence. The smell of the stable, of the tan-yard, of the shambles, of the dissecting room, of the tripe factory, of the paper mill, of the woolen mill, may become agreeable to the operatives, but the process of coming to enjoy these perfumes, so repulsive to the natural senses, is not a good one."

"In spite of the praise of onions in their digestive help, we may question their sanitary value for the olfactory nerves, and any fondness for their pungency is a depraved taste in one direction, however healthful it may be in another."

At this far later period, odors still are without control. One of the most difficult problems of air conditioning is the inability to remove the odors of stale cigar and pipe smoke that cling to drapes, upholstery, and clothing. The offensive odors of the petro-

leum refinery may travel a distance in excess of twenty miles. Newer types of paper mills contribute odors more distressing than any known at the time of Brigham's observations. Ozone, chlorine, and other chemicals have been applied to gross exposures but only with desultory results. Fortunately odors do not themselves induce serious disease. No less through the causation of nausea, limited breathing, loss of appetite, mental irritation, they still may be rated as disturbing.

"There are men whose work must be always in loud, or sharp, or harsh, or strident sounds, which strike or vex the ears. Boiler makers, for instance, have to work in incessant pounding upon resonant metal. In a cotton mill, the air is full of buzz and whir, and chaotic roar, which bewilders and confuses the occasional visitor. The city editor in his office must think and write with the din of rattling wheels on stony pavements all the time in his ears. The brakeman on a railway cannot get away from the noise of rolling axles and shaking joints. Men get wonted indeed to these nuisances, yet this reconciliation to noise does not set aside the essential evil. Even musical sounds may become peril to the nerves when they are long continued and mechanical. The crooked back of the organ grinder is not his worst misfortune. A man who has to do his daily task with violin practice in the room above him and piano practice in the room below, risks his hearing if not his sanity, almost as surely when the practice is accurate as when the practice is blundering."

Fortunate, indeed, was the Reverend Mr. Brigham, in his comparative freedom from noise and other external stimuli, despite his earnest protestations otherwise. Day by day, urban life affords not less than a hundred fold more external sensory stimuli, what with night made hideous by radios, telephones, automobiles, horns, airplanes, apartment neighbors, flashing electric signs, nearby factories, streetcars—people whose habits turn night into day. A hundred years ago the most disturbing noise common to village life and the one that serves as the prize example of unwanted and disturbing sound was the crack of the whip as some driver threatened a lagging horse. Compare that with the irritation that comes to a would be sleeper when some six families returning from the movies at midnight decide that a little radio music is in order.

"How much of the beauty made and revealed comes in the ruin of those who bring it."

"Deformities of the frame are another probable result of work in some of the occupations of men. The stoop of the scholar is proverbial, and his occupation is not the only one that is marked by round shoulders and a crooked back. Other work twists the body sideways, and confirms curvature of the spine. Other work may make bandy legs, draw one shoulder down or the other shoulder up, or enlarge the joints, or derange the adjustment of the physical organs. One kind of work develops muscles abnormally, another kind leaves most of the muscles weak and flaccid. Any work is unwholesome which draws away strength from one set of organs to give it to another set, or which distorts the body, and there are not a few mechanical employments which do this, all the more in their improved processes. They make the men as crooked as the machines and as eccentric in their movements. The conventional posture in work is often very disastrous to bodily symmetry. That the Turks are so often bowlegged probably is the result of their crossed and doubled extremities as they squat on their counters; and no better fate can be expected for Christian tailors who assume that position. A shoemaker, on his low bench bending all day long over his stitches and his lapstone, may be a virtuous man, but he can hardly remain 'upright' in the literal sense of that epithet."

"Dangerous exposure, too, is a risk which in some occupations men are called to meet, exposure to heat, exposure to cold, exposure to accident. Some occupations keep the workman in a temperature too high for a salamander, others keep them in a temperature more congenial to a white bear or a walrus than to a man. It is not wholesome for a man to be roasted or frozen in his work, to be always melting in perspiration, or always shivering in chill."

"No contrivance has yet been invented which can give perfect atmospheric conditions to every kind of toil, and get clear of all the hazard of moist and dry, of hot and cold, of bracing and debilitating atmosphere."

The boon promised in air conditioning—artificial climates—has not been fulfilled through the acquisition of air that duplicates the qualities of a hill-top air on a spring morning. "One man's meat is another man's poison" is more obvious in air conditioning than is desired by the air conditioning equipment manufacturer.

"These illustrations of the risks incident to the various ordinary occupations of man are enough to show that none of these occupations are altogether wholesome. We might show that in another way, by simply enumerating the various sorts of disease which can be directly traced to one or another kind of work—the different organs of the body which are affected. Some kinds of work bear hard upon the digestive system, and make dyspeptics. Others trouble the liver—make it torpid, slow in its action, and so a clog in the body. Others press upon the brain, destroy its vigor, and reduce it to softening or insanity. Some kinds of work ruin the skin; others spoil the secretions, and show their mischief in the glands and the kidneys. There are toils from which the bones become brittle and the teeth decay; there are toils which make the heart beat fiercely, and the blood rush like an angry river. Some of the noblest toils are most wearying, and fatal to nervous harmony, while others have dullness and sluggishness as their certain issue. Sometimes the occupation has one special danger which can hardly be escaped, at other times it has a mingling of dangers."

Opposite every item of possible injury listed by this early writer might be placed a

series of substances now applied in industry capable of provoking the pathology mentioned. For instance, he notes, "Some kinds of work ruin the skin." Industry of today utilizes no less than 900 materials that attack the skin leading to industrial dermatoses of various forms.

"In what has thus far been said, only the direct influence of different kinds of work upon bodily health is considered. But occupations act upon health quite as effectually in their influence upon the mind, as they are elevating or depressing, as they are concerned with little or large things, as they are routine or venture, drudgery or speculation, as they have variety or are all in one kind. Some sorts of work foster melancholy, perpetual sadness, a brooding reflection which hinders sleep and spoils digestion. An undertaker, for instance, who handles the dead every day, and deals in the trappings of woe, ought not to be a cheerful man, even if he is an exemplary Christian."

A banker's business is dangerous to his health in such a time as this, when he cannot gauge the popular madness, or tell what kind of money the people will choose, or what the dollar will be worth in the near future."

"Another, of sensitive conscience, loses his calmness of soul, because the exigencies of his business require him to fall from his moral standard and do acts that are questionable. Another, holding office of trust, is burdened by his responsibility, or vexed by the trammels which hold him back. He cannot do what he wants to do, what he ought to do, what he feels others will expect him to do. Another, in similar position, is made unhappy by what the newspapers and the politicians say of him, by their charges against his integrity, their sneers, their insults, their caricatures, their misrepresentations, the lies which they tell."

"Any occupation which involves or stimulates mental and spiritual troubles is as truly bad for health as if it crooked the spine or stiffened the knee or paralyzed the bodily organs."

Possibly this pioneer as he composed his remarkable paper fondly conceived that by 1940 all mental and emotional stresses would have been eliminated from human life. He may have contemplated mental processes purely on a basis of reality and objectivity. Were he to return, bringing with him Moses and Aristotle, all would be struck not so much by the differences in man's behavior in contrast to that of their respective periods as by their utter conformity. Locked in an assembly room shorn of telephones, loud speakers, electric lights, air conditioning, typewriters, and other such mechanical contrivances, any long dead visitor might participate in general deliberations with comfort and facility.

"There never were so many trades in the world as there are now. There are far more products of industry in various kinds in the ordinary Michigan homes than there were in the great palace of Solomon, the magnificent Hebrew king. In the matter of work, the tendency is toward diversity and not toward unity. While science is bringing the forces of the physical world together, reducing them to a few elements, or to a single element, civilization only divides and multiplies the arts."

"One of the great industries of this land, which today gives work, and profit, and support to not less than a hundred thousand of men, women and children, the drawing and refining of petroleum, was not known fifteen years ago. Another art, the taking of photographs, which counts its workmen by thousands, is wholly of this generation."

"Some may die sooner in consequence of the kind of work which they do, but nearly all will die of want if they do not some kind of work."

"One is never in more danger physically or spiritually, than when his permanent occupation is no occupation, only in killing time."

Compare these sagacious writings with a recent statement by our contemporary Sir Thomas Oliver when he said, "The most grievous of all occupational diseases is that of having no occupation."

"The safeguards against danger in work are of various kinds. Some are in outward appliances, some in precautions, some in diet and regimen, some in antidotes. In some kinds of labor the safety can only be gained by outward appliances. A stonecutter, for instance, or a knife-grinder, must have some barrier against the dust which his work raises—some mask to protect his eyes or lungs."

"Thousands of lives are lost in such occupations from the recklessness which casts aside these ready aids."

"There ought to be a compulsory rule requiring all workmen in a cutlery workshop or in a stone-cutting shop, under a roof, to wear a covering for the head which shall be impervious to the coarser particles; as fine a mask indeed, as a clear sight of the mask will allow. Added to this should be some contrivance which will blow the dust away from the workmen; should cause a current of air strong enough to carry it out of the workshop. Such contrivance may be easily provided."

"Steel and stone workshops, without this protection, ought to have a convenient graveyard in their rear."

"Many occupations may be rendered comparatively healthy by some contrivance for consuming the smoke, which is now allowed to escape and to pollute the air."

"It is much to be desired that the ingenuity which is turned in the direction of labor-saving should be turned also in the direction of health saving in the processes and implements of human toil."

"Phosphorus may be, as the philosophers tell us, the life of the brain, and the life of the thinking soul; that fact does not disprove the fact that in its manipulation it is a deadly foe to the life of the body. And it is a heavy penalty paid for this cheap and ready bringing of light, that the match makers get sorrow and darkness for themselves in bringing light to others."

It is no longer commendable that industry in any of its ramifications operate graveyards as rear door adjuncts. The introduction of the very types of protective meas-

ures together with many additions has made this unnecessary.

"Dry dyspeptics in our land deplore the madness which wastes so much time in ball matches and boat races and excursions, but such things drive away dyspepsia, though they may not fill the coffers."

"Tonics, and alteratives, bitters, and blue pill, will not counteract the poison in the air, or the curse of dampness and darkness. It is the worst of quackery to pretend that particular trades and professions have their appropriate medical antidotes, that one nostrum is efficacious for ministers, another for miners, and another for scavengers. Universal remedies, like Brandreth's pills, are bad enough, but specific remedies against the ills to which certain trades are liable, are a still worse delusion. Any business which requires him who follows it to carry a panacea in his pocket, to be shaken and taken five times a day, ought to be left forthwith."

"Society has a right to say as much as this: that deadly trades shall be allowed to destroy only those who voluntarily choose them, and that no occupation shall become a nuisance or a danger to the homes or the shops which surround it. It has a right to put specially unhealthy occupations under a sort of ban, to warn against them, to isolate them, to make a quarantine for them as much as for infectious diseases."

"He must build his powder mill away from the village and the main thoroughfare. He must set his soap factory where the prevailing wind will carry off its fetid odors. He must not put his stable close to the windows of fine drawing rooms, to pour into these its redundant ammonia. He must not set his stamping machines where their thud and shock will stun the sensitive ears. In proportion to their damage to the health and safety of the general public, must the unhealthy occupations be kept at a distance, out of sight and hearing and of contagion."

Vain is the concept that dangerous industries may be isolated. Many a manufacturer has sought to establish an offensive factory far remote to human habitation only to find before his factory roof has been installed, workers' homes are springing up all about him. Hot dog stands and filling stations pre-empt nearby corners. A grocery, garage, and real estate office appear in due course. Soon these outraged residents and business men demand of the courts injunctions barring the well meaning manufacturer from polluting the atmosphere to be breathed by these innocent and suffering citizens.

"Too many of the inventions which have abridged labor have brought disease in this service. It is time that genius should undo the evil that genius has done."

Already "genius" in the form of industrial hygienists, physicians, engineers, chemists has undone some of the evils of dangerous trades. But it is to be remembered that no genius or manufacturer if he be other than a genius created all of the health exposures of industry. Nature provided lead that is toxic; silica that causes silicosis; benzol that is a poison. All too often the attitude of the public is to culpate the manufacturer as though he created the dangerous properties of work materials. While this is ludicrous, it is no less the obligation of the manufacturer to manipulate harmful work materials only under such conditions that no worker may suffer injury.

Regardless of the source of the man-damaging activities in industry, the industrialist no longer is blind to their presence. Already in many industries the protection of the worker is as significant in the plant's operations as the turning out of its products. The development of mass production in this country has following in its wake the actuality or potentiality of nearly 2,000 occupational diseases. This evil eye that pursued and overtook industry possibly reached the peak of its malactivity about 1933-1935.

In this year of grace, the potential causes of occupational diseases in America's industries are without precedent, but the actual number of cases is on the wane. Industry will continue to grow, barring catastrophies; the possible injurious materials manipulated by industry likewise will be added to year by year. No less, except under the emergencies of war and similar unwanted happenings, real cases of trade diseases will lessen. No paradox confuses this statement. Preventive measures make possible the use of any substance necessary to industry. Occupational diseases ever will be a threat, seldom will they become actualities.

"It is time that genius should undo the evil that genius has done." This challenge was accepted by industry. Much of the evil has been undone.

The anlage of the well protected state of Michigan industrial worker as he daily goes about his duties substantially free from direful risks to his health in no small measure may be traced to the facile pen of Charles H. Brigham — Michigan's first industrial hygienist.

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"Every man owes some of his time to the upbuilding of the profession to which he belongs."

—THEODORE ROOSEVELT.

EDITORIAL

THE HUMAN FOOT

WITHIN the past two months we have published reviews of two important books† on diseases of the foot, by well known medical publishers. The graver foot conditions such as deformities and fractures usually receive adequate attention from the orthopedic surgeon or from the general surgeon and general practitioner. The minor foot troubles, if they receive any attention at all, are treated by the chiropodist or the so-called "foot specialist." The almost universal minor foot disorders may be seen by observing people on the street or about their daily occupations. Corns are of ancient lineage. Even Shakespeare, who has overlooked nothing that pertains to humanity, has included them among the ills that flesh is heir to.

"Welcome, gentlemen! ladies that have their toes
Unplagued with corns will have a bout with you:
Ah ha, my mistresses! which of you all
Will now deny to dance? she that makes dainty,
She, I'll swear, hath corns."

Fashion is often the dictator that results in so much discomforts. There is as much individuality in feet as there is in the human body itself, yet many who content themselves with shoes made by mass production insist on tailored or made-to-measure clothes.

Anatomically, the foot is as complicated as the hand. It is, however, heir to a greater number of disorders due to various things, such as its encasement from light and ventilation in a more or less ill-fitting shoe, to the fact that it bears the weight of the body and either becomes or tends to become edematous with pathology in the body itself or with injury to the venous and lymph circulation when the foot itself is injured. Then there are certain dermatoses of the foot in a class by themselves.

Perhaps no other part of human anatomy has become so much altered in response to evolutionary demands. Omitting the millions of years required to reach the arboreal stage of primate existence, we have the insignificant heel of the arboreal primate whose greatest concern was prehensile, namely, the ability to grasp the trunk of a tree in climbing. When our ancestors descended from their high perch, the demand placed upon the foot was that for a base or pedestal to support the upright body. This called for a larger heel and other important changes in the longitudinal and transverse arch of the foot. The upright position assumed by man placed greater stress on the circulatory vessels of the leg as well as the arteries and veins of the foot. The very fact of man's uprightness (in a physical sense) has made possible, particularly in his more advanced years, varicose veins, leg ulcers and other pathology either purely local, or, as intimated, due to systemic conditions.

Regarding the shoe. Manufacturers have endeavored to meet the requirements of the greatest possible foot comfort. Dominated

†Dickson, F. D., and Dively, R. L.: Functional Disorders of the Foot. Philadelphia: J. B. Lippincott Co., 1939.
Hauser, E. D. W.: Diseases of the Foot. Philadelphia: W. B. Saunders Co., 1939.

by the dictation of fashion, they have not wholly succeeded. We wonder how much assistance and encouragement they have received from the medical profession and particularly the orthopedic surgeon. The human foot is a big field for the kind of preventive medicine the orthopedist is capable of practicing. The two works mentioned here will repay the closest study and we would add the name of a third, namely, the work of Morton, which is a classic on the subject.

HIGHWAY SAFETY

ACCORDING to P. G. Hoffman, president of the Automotive Safety Foundation, the fatality rate for 100,000,000 vehicle miles the first six months of 1939 was 10.9. This is a reduction of 37.3 per cent in four years. In other words, if the fatality rate subsequent to 1935 were maintained, 29,000 more persons would have lost their lives. The four year decrease in fatalities has also been accompanied by a decrease of 1,000,000 accidents as well as the elimination of one billion dollars in property damage. Hoffman is optimistic in the prediction that in another four years highway fatalities may be reduced to six per 100,000,000 vehicle miles.

All this is pleasant reading. A slowing of the tempo of American life and a little more consideration for the other fellow; in other words, if the manners of a well ordered home were put into practice on the streets and public thoroughfares, the traffic problems would be near solution.

A menace to road and street safety is the bicycle, which has become recrudescent of very recent years and, like proverbial necessity, knows no law. The majority of bicycle riders are children who pay not the slightest regard to traffic regulations to which motorists must conform. No one wants to injure a child, yet the chance some children take with their lives is horrifying. Here their parents are to blame. Children who cannot be controlled or who are unmanageable by their parents should be deprived of the privilege of the public highways. If there are laws governing bicycles on the streets, they should be enforced. It is not a matter of rights. The motorist is taxed in every conceivable way for the construction and maintenance of streets. The bicycle contributes nothing. The motorist has a right to feel that the highways are safe from unexpected and lawless cyclists. It is hoped that time may soon come when police authorities will cease to wink at children riding double on bicycles and running through red traffic lights and stop streets without any regard to what might be dire consequences.

WAR

A SUITABLE subject for discussion in a medical journal? Yes. There is perhaps no other profession so much concerned. The object and purpose of medicine is the antithesis of war. One destroys life and maims those who escape destruction; the other conserves human life and strives to alleviate suffering. Everyone's earnest hope is that hostilities in Europe may soon cease and that the common sense of most may hold fretful realms in awe, when

> "The war drums shall throb no longer
> And the battle-flags be furled,
> In the Parliament of Man
> The Federation of the World,"

when the heavens shall be filled with commerce, instead of "ghastly dew" from the "nations' airy navies."

Animal passions, to which emotion is akin, served a useful purpose as a means of protection when might was right in the early evolution of the race. With the growth of civilization, reason has, to a large extent, prevailed over brute force. War, however, is a throw-back, a reversion to primitive savagery. It results in no useful purpose. There are no victors in war any more than there are victors following an earthquake disaster or a volcanic eruption. Emotions should always be kept within control because, when out of bounds, they tend to dethrone reason and to set judgment at naught.

> "Can you tell whether war be a cause or a consequence?
> Down with the passions that make earth hell.
> Yea, down at your own fireside
> With the evil tongue and the evil name
> For each is at war with mankind."

War is a consequence—a consequence of cherishing fears, hatreds, illogical and wishful thinking, and of giving truth second place. The scientific method, which has in-

fluenced modern medicine to such a degree, has contributed more towards the attainment of truth than any other *modus* since the dawn of human intelligence. We all know what it is—observation and deduction, or experiment and observation, checking and verification of findings, with belief only on evidence. How often in the ordinary course of events are we dominated by prejudices? How often are we prone to overstatement or understatement? Liddell Hart* has expressed the situation admirably as follows:

"The longer I have watched events, from a close-up view, the more I have come to the conclusion that most of our mistakes, and troubles, are not due to natural faults of judgment. But that the real cause lies in the habit—on all sides—of saying something more, than we know to be true. This almost universal practice of distorting simple matters of fact, whether by suppression or exaggeration, is inspired by concern for the interests of party, class, or profession—at the bottom this so-called loyalty being too often self-interest. We are intent on 'making a case', rather than on finding the truth. We play the part of counsel for the defence or for the prosecution. It is easier, and more popular, than the laborious effort of becoming scientific investigators."

Freedom has become an enchanted word with us. The highest attainment of freedom, however, to continue Liddell Hart's contention, is freedom from prejudice. Probably there is no greater call for such freedom than at the present time when emotions are apt to be tense. Many of us have prejudices, fortunate if they are only minor ones, which we fondly cherish. It is this unscientific way of approach, however, that gets not only nations but individuals into trouble. What better time to practice the virtues of tolerance in thought and deed than the approaching season of peace on earth and good will among men?

PURELY PERSONAL

WITH this number of THE JOURNAL, I retire from the editorship to confine my attention to private practice. For twenty-three years, out of over thirty spent in the practice of medicine, I have devoted part of my time to medical journalism. The first ten years of the thirty included editorship of the *Detroit Medical Journal;* then after a period of seven years' separation from the odor of printer's ink, in 1926, I was prevailed upon to edit THE JOURNAL of the Michigan State Medical Society. For thirteen years I have endeavored to perform this function. It has meant the devotion of practically all the time not spent at my practice, but throughout these years the work has been unusually interesting. It has brought me in contact with a great many members of the medical profession whom it has been a pleasure to know.

During this period I have tried to maintain consistency in the editorial policy of THE JOURNAL, for while the general editorial policy is defined by the Council, the details must always be the work of the editor. This is as it should be. Presidents and officers are elected to serve their term of office and retire. The society's JOURNAL makes for continuity. It is the link that binds successive Council administrations together and presents a permanent record of their achievements.

The Council, however, has given the editor every freedom consistent with the general policy of the society, which, it is needless to say, is an incentive for any editor in turn to give of his best.

I am reminded of a statement by Edmund Burke, who declared (referring to a representative of the people) "that his unbiased opinion, his mature judgment, his enlightened conscience he ought not to sacrifice to any man, or to any set of men living. . . . They are a trust from providence, for the abuse of which he is deeply answerable. Your representative owes you, not his industry alone, but his judgment; and he betrays you instead of serving you, if he sacrifices it to your opinion." However, an individualist by conviction, it has been an easy matter to advocate the viewpoint of the physician in private practice as opposed to that of state or socialized or subsidized medicine. It has never been any sacrifice of judgment to the opinion of others. Many letters I have received from time to time as well as personal expressions would make any editor so favored, feel that his work was not wholly in vain.

Furthermore, an effort has been made to produce a JOURNAL attractive in format as well as clean in typography. The endeavor to present the best and to encourage the best in Michigan medicine has been the laudable ambition of the Council of the Society who publish THE JOURNAL. One

*Hart, Liddell: The Defense of Britain. Random House, Inc., New York. Quoted by permission of the publishers.

thing that has impressed me perhaps more than anything else is the large place THE JOURNAL has come to occupy in Michigan medicine. It has become one of the major activities of the Council. As a medium for publication for contributed articles, it has resulted in an incentive to write, and the urge to write has meant greater thoroughness in the study of medicine and its allied specialties; and here we have postgraduate medicine at its best. Had circumstances permitted a larger JOURNAL, many other excellent papers would have appeared, which on account of their length had to be excluded.

Twenty-three years is a long time to devote to editing manuscripts, writing editorials, reading proofs, making decisions, answering correspondence, trying to keep abreast of the entire field of medicine or at least a respectable distance behind, and numerous other details that demand an editor's attention.

I wish to take this opportunity to thank past presidents as well as the present president of the society, Dr. Burton R. Corbus, and counsellors, Dr. L. Fernald Foster, Secretary, and Bill Burns, Executive Secretary, and my many friends in the profession for repeated kindnesses that I can never adequately repay.

With sincere good wishes for a Merry Christmas and a Happy and Prosperous New Year.

—J. H. DEMPSTER

CHRISTMAS BELLS

Oh, the bells—the Christmas bells—
Ringing clear across the dells,
Ringing, singing, winging joy,
Children dancing, laughing, coy;
Heaven's near, with radiant bliss,
Ecstasy and blessedness.

There's no chimes in war or hell,
There's no bliss where soldiers fell;
There's no smile in Devil's Den,
There's no love in hate, ye ken;
But the bells—the Christmas bells—
Happiness and joy foretells.

Oh, the bells—the Christmas bells—
Waft the sound o'er snowcapped fells;
Sing with glee, tae skies above,
Songs of cheer and joy and love;
Ring the bells o'er all the earth,
Ring the new day and the birth;
Christ is here—let hatred cease,
And let us have Eternal peace!

WEELUM.

DR. ROY HERBERT HOLMES

Dr. Roy Herbert Holmes of Muskegon, Michigan, who was appointed chairman of the Publications Committee of the Michigan State Medical Society at the annual meeting in Grand Rapids last September,

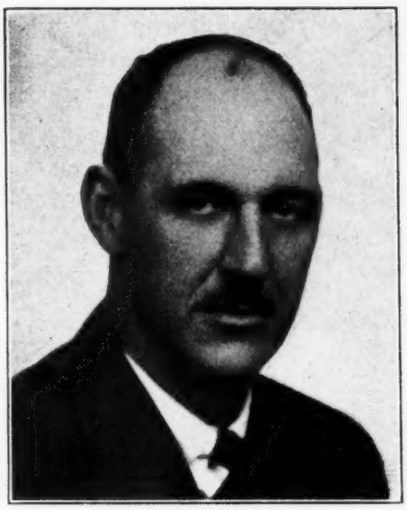
DR. ROY HERBERT HOLMES

has also been made acting editor of THE JOURNAL until a permanent appointment is made at the annual meeting of the Council which takes place in January. Dr. Holmes is well qualified for the position. A "Who's Who" description would run something like this: Born in 1896, he attended public school and high school in Grand Rapids. His premedical work was taken at Kalamazoo College and the University of Michigan. He attended the University of Michigan Medical School, where he was graduated in 1922. Dr. Holmes' interneship was spent at the Massachusetts Memorial Hospital, Boston. Following his interneship, he spent twelve years in the general practice of medicine, when he decided to limit his practice to dermatology. His special training was obtained at the Skin and Cancer Hospital, New York. At the present time, he is consultant in dermatology and syphilology at the Hackley Hospital and Mercy Hospital and consultant in medicine at both hospitals, where he is also instructor in syphilology and dermatology in the Nurses' Training Schools. He was made a Fellow of the American College of

Physicians in 1936. For the past six years, Dr. Holmes has been editor of the *Muskegon County Medical Bulletin,* where he has shown ability of high order, particularly in his breezy comments on medical affairs as they affect the Muskegon County Medical Society. There is one omission in this Who's Who sketch which, at the time of going to press, we are unable to fill, namely, Dr. Holmes is unmarried. As chairman of the Publications Committee, he has made a number of valuable suggestions for future journals.

DR. R. J. HUBBELL

Dr. R. J. Hubbell of Kalamazoo has been appointed councillor for the fourth district to fill out the unexpired term of Dr.

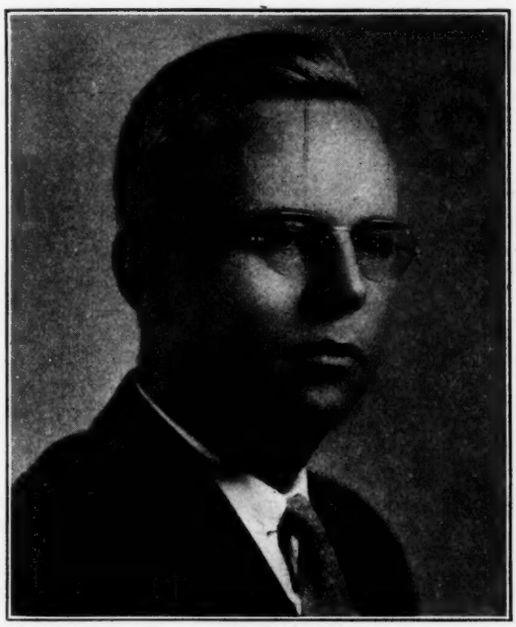


Dr. R. J. Hubbell

F. T. Andrews, who has been appointed Director of the Bay County Health Department. Dr. Hubbell is a graduate of Northwestern University where he received his B.S. in 1918 and M.D. in 1923. Following his graduation, he spent his internship at the Wesley Memorial Hospital, Chicago, from 1922 to 1924. From 1924 to 1929, he was engaged in general practice in Kalamazoo. The next two years he spent in graduate work in neurology with Dr. B. A. Thomas of Philadelphia. Since his return to Kalamazoo, his practice has been limited to urology. Dr. Hubbell was secretary of the Kalamazoo Academy of Medicine from 1931 to 1933 and president of the Academy of Medicine in 1938.

DR. VERNOR M. MOORE

Dr. Vernor M. Moore has been appointed chairman of the Finance Committee of the Council, a position which he assumes after four years' experience as a member of the



Dr. Vernor M. Moore

committee. Dr. Moore was appointed a member of the Council in 1935 by President Richard R. Smith to succeed Dr. B. R. Corbus. The position of "guardian" of the treasury is an important one and it will be filled by Dr. Moore as successfully as it has been by his predecessor, Dr. H. R. Carstens, now president of the Council.

AS YOUTH SEES IT

Drums, bugles, and tramping feet sound in the streets.
Young men tear themselves from their mothers' arms.
Weirdly painted ships creep from the shores of their mother countries, into the still dark night.
Sad-eyed, silent women wind and knit, knit and wind, wind and knit.

Whispered orders sent down through the lines at the zero hour.
Gaunt men creep from vermin-infested trenches into a cold dawn and stumble over the bodies of the dead, as they steal across reeking ground.

Why?
To kill their image—youth.
Shells explode in the dim break of day.
Dying boys breathe prayers through parched, pain-twisted lips.
Terrible, empty silence reigns over ten-thousand rows of stark white crosses.
Youth is dead.
Must it die again tomorrow?

—Eleanore Pino.

Eleanore Pino is the daughter of Dr. Ralph Pino, president of the Wayne County Medical Society, and Mrs. Pino. We congratulate the young woman on the excellence of the poem.

THE PHYSICIAN'S WIFE AND THE COMMUNITY

HARRISON S. COLLISI, M.D., F.A.C.S.†
GRAND RAPIDS, MICHIGAN

How a physician's wife fulfills her rôle as a valuable aid to community welfare is a subject that may be of some interest to the public, especially at this time when the Michigan State Medical Society and the Woman's Auxiliary to this organization are in annual session in Grand Rapids.

Of recent years much has been written about doctors of medicine and their profession. History tells us that famous "Knights in the Profession" guided groping mankind out of the terrors of darkness and superstition; interesting biographers relate how the "Valiant Host in White" shook dice with destiny to fight cholera, yellow fever, malaria and typhoid; revelations of the confidential relationship of physician and patient form the structures of more than one alluring tale that has brought the real, human side of medicine to the public. But little has been written or told of the physician's wife and the part she plays in this great incomprehensible miracle of human existence to which her husband contributes so generously and so unselfishly of his knowledge, skill and judgment.

No group of women are more altruistic, unselfish and as understanding of the physical and social afflictions of humanity as are physician's wives. They see and hear more of the all-too-prevalent distressing problems which their husbands meet in the practice of their profession. Physicians' wives are true humanitarians, who have a vital interest in their work, which they find provides a channel of expression for some of their most elemental and deeply-rooted impulses.

Physicians' wives, like all other wives who are cognizant of the great importance of the need for harmony in the home, regard their husbands as essential persons upon whom patients and community depend for the full value of their services. As the mental attitude and spirit of a physician determine his success, a physician's wife realizes that his home life should be a happy one and endeavors to maintain this happiness and thereby assist her husband and the community. That physicians' wives keep their domestic responsibilities well in hand is shown by the 1930 census report which reveals that less than eight-tenths of one per cent of physicians' marriages fail. This places the profession second only to the clergy in matrimonial stability.

The physician's wife plays a definite part in the modern social-thinking community. That she may become of a constructive, wholesome, practical value to the community, she recognizes she must progress far beyond the barter of primitive economics and mere social contacts. Because she is really second to the profession itself and lives in an atmosphere of science, a physician's wife can do much to dispel the antiquated ideas of her own sex regarding superstition, fear, ignorance and false modesty—civilization's most treacherous enemies. It is a well-known fact that many women consult physicians about themselves because their fears were set at ease by the assurance of the physician's wife that they might be unnecessarily alarmed. The attitude of the physician's wife toward her sister of the laity is so well expressed in the quotation, "Scientific knowledge enters into the art of living and loving. Life is sad without love."

The idea of constructing a Woman's Auxiliary to the medical profession had its inception in the brain of a Texas woman in 1917. Mindful of the fact that there was a need for greater friendship and cooperation among physicians' wives, that a physician's home life should be made a happy one, and that there was a definite opportunity to be of service to the community, she invited a group of physicians' wives to her home and suggested that they form an organization. This met with a ready response and the wives of the physicians of Dallas, Texas, formed the first Woman's Auxiliary to a county medical society. News spread and soon other county societies were organized, ultimately resulting a year later in the organization of the Woman's Auxiliary to the Texas State Medical Association. This venture proved so successful that four years later, in 1922, a Woman's Auxiliary to the American Medical Association was organized, which today includes 39 states and has a total membership of more than 21,000.

In Michigan, the Woman's Auxiliary to the State Medical Society, now boasting a membership of over 1,000 women, was organized in 1927 at Mackinac Island. Like all other state auxiliaries, its fundamental objectives extend into three fields—first, to establish friendships and comradeships among physicians' wives; second, to gain a more comprehensive, intelligent and sympathetic understanding of the medical profession; and third, to participate in the altruistic work that constitutes so large a portion of the physician's obligation to society and to the community.

The contribution of physicians' wives to community welfare in which the Michigan Auxiliary is particularly interested, is made by means of organized efforts to promote *health education*, to establish medical *public relations*, to support good *legislation*, and to engage in worthwhile *philanthropic endeavors*.

Health Education in the community is carried out by sponsoring lectures by competent medical

†Dr. Collisi is "advisor" on the Advisory Committee to the Woman's Auxiliary of the Michigan State Medical Society.

authorities on such subjects as cancer control, maternal welfare and child hygiene, tuberculosis, and preventive medicine. Essay contests in the schools are encouraged, periodic health examinations of children and adults are advocated and radio talks are given on health topics of importance to the public. Posters depicting the rewards of immunization and accident prevention, as well as other stories in scientific medicine, are exhibited in advantageous places, where they will appeal to interested people. Most important of these activities is perhaps the solicitation of subscriptions and the distribution of *Hygeia,* the periodical health magazine of the American Medical Association—the only one of its kind in America. By these means authentic reliable and vitally essential health information is brought to every man, woman and child.

Public relations in the community are established by making contacts with civic-minded groups, who desire enlightenment and the truth on medical subjects—women's clubs, parent-teachers' organizations, literary societies, Y.W.C.A.s, the League of Women Voters, the Woman's Auxiliary to the American Legion, church and other groups. Today, organized medicine realizes more than ever the great need for good public relations, and that foremost in this relationship are the physicians' wives, who share success or failure with their husbands. Physicians' wives have the enthusiasm, energy, optimism and appeal which is so essential for good public relations.

Legislation involving medical questions often concerns the laity, especially when it would deprive them of the free choice of physician, or might disturb the patient-physician relationship. If legislation is proposed that tends to lower the high standards of medical practice by permitting untrained individuals to venture into fields of scientific medicine in which they are not qualified to diagnose and treat the ill, it then becomes the duty of the wives of doctors of medicine to call attention to and enlist the services of the thinking people in the community to defeat such legislation. On the other hand, good legislation, such as that making it possible to have non-profit group hospitalization and voluntary group medical care plans in Michigan providing for "adequate medical care for persons of limited income," is whole-heartedly supported by the Woman's Auxiliary to the Michigan State Medical Society.

Philanthropic endeavors that help community welfare have always been prominent in the fields of activity of all civic-minded women. Physicians' wives, particularly, engage in them because they deal with human problems which are close to their husbands' profession—solicitation of funds for benevolent societies, community chest campaigns, hospitals, and many other philanthropic societies whose functions consist of relieving unfortunate people.

The physicians' wives have accepted their responsibilities with noble idealism and a firm determination to render a public service of benefit to mankind that will uphold the honor and dignity of traditional medicine. Their maternal instincts have taught them that the suffering and anxiety of afflicted mankind knows no class distinctions—prince and pauper alike need sympathy and succor, when afflicted.

Naturally, physicians' wives have learned that "women are still young at fifty"; that woman's span of life has almost doubled that of her sister of ancient Greece, whose life expectancy was 29.4 years as compared to that of hers today, which is 62.8; and that cancer, tuberculosis, and other diseases, which formerly instilled fear into the human race, not only are preventable but definitely curable, if discovered early. Because of their close association with the medical profession and their knowledge of preventative medicine, they constantly strive to keep physically fit.

Physicians' wives accept woman's challenge to civilization that she be given the three most priceless things in life—Health, Happiness and Contentment—with the hope and enthusiasm that they shall come through their efforts to teach the gospel of their husbands' profession.

LUETIC POLYNEURITIS

(Continued from page 1056)

sent to a course of arsphenamin treatments failed. I had to resume the bismuth, mercury, potassium iodide, and thiamin therapy as outlined previously. Again steady improvement followed. She kept up her treatments till the beginning of April, 1939, when she left Detroit for Ohio.

On July 5, she wrote me advising me that she had made no arrangements for any treatments over there, that she is still taking the potassium iodide drops and Cal C Tose, that she gained about 10 pounds since she left Detroit, that the tenderness in her right hip is leaving her gradually, that her right leg still seems to be slightly shorter than the left one, and that she still feels some discomfort whenever she has to sit on anything hard.

Conclusions

1. The factors responsible for the neuritis were (a) faulty posture giving rise to pressure on her right hip, and (b) hypothiaminosis resulting from either an unbalanced diet or from a faulty absorption of thiamin due to pathologic changes in her liver and gastrointestinal tract caused by her latent lues.
2. Thiamin is indicated in the treatment of neuritis due to hypothiaminosis.
3. Acetylcholine is a new item to our armamentarium and caution should be used in its administration in cases of neuritis. The doses must be small and one should never mix it with the thiamin, but administer it separately.
4. Physiotherapy is still a useful adjunct in the treatment of neuritis.
5. In every case of neuritis, one should investigate the diet and the habits of the patient. A good family and personal history of the patient should be obtained and the patient's statements be verified by having all the necessary blood and urine tests; otherwise, a case of diabetes or lues may be overlooked.
6. Trauma aggravates neuritis.

YOUR FRIENDS

EVERY month during 1939 the following advertisers carried their friendly message to the medical profession of Michigan through the pages of THE JOURNAL:

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Additional advertisers whose message appeared in THE JOURNAL during the year included:

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Doctor, remember these firms when you are in the market for pharmaceuticals, equipment or service. JOURNAL advertisers are selected; their products are approved. They help make it possible for the Publication Committee of your State Medical Society to send you such an outstanding scientific magazine as THE JOURNAL of the Michigan State Medical Society. Take a minute and tell the advertisers you saw their message in THE JOURNAL.

President's Page

HOLIDAY GREETINGS

To every member of the Michigan State Medical Society, I wish a Merry Christmas and a Happy and Successful New Year.

In the midst of war alarms and domestic concerns, we turn aside for the moment to the consideration of age old verities wherein we may hope to find that spirit of Peace and Good-will so lacking in a disturbed world.

To one beloved member I would extend a very special Christmas greeting, and wish for him a continuation of health and happiness—to Doctor James H. Dempster, retiring editor of THE JOURNAL. In the thirteen years in which he has been editor, he has earned the gratitude of our entire membership for his earnest application to the production of a high grade JOURNAL. Always he has stood for the finer things in medicine and this has been reflected and carried to us in the editorial pages. He has endeared himself by his gracious and considerate manner. There is not a member of the Society but will note his resignation with real regret.

Yours, most sincerely,

Burton P. Corbus

President, Michigan State Medical Society

Department of Economics

L. Fernald Foster, M.D., Secretary

OBJECTIVES AND ACTIVITIES OF M.S.M.S.

Professional and Educational:

"It is my opinion that each year our Society means more to each and every one of us. In my opinion, no M.D. can really afford to withhold membership. It is my wish that the Michigan State Medical Society make great progress and that I may be privileged to do my small part toward that end."—W. B. Fillinger, M.D., *Ovid, Mich.*

The Michigan State Medical Society and its component county societies bring you these valuable benefits of membership:

1. Assurance of a high ethical standing for you in the community, the state and the nation, before the public, the law, and the profession.

2. Postgraduate courses and lectures to keep you in touch with medical progress and to improve professional ability.

3. Your common interests safeguarded through the vigilant work of democratically selected officers who are (a) men of your own kind; (b) who know your problems and those of your patients; (c) who serve generously without compensation; (d) who need and request your coöperation and advice.

4. Benefits accruing from the action of numerous committees constantly working to advance your interests as a physician in your community; machinery solving problems of preventive and curative medicine which could not be worked out by you as an individual, even with a great sacrifice of time and effort.

5. Maintenance and constant improvement of standards of medical practice for the protection of patients.

6. A monthly Journal of high quality with the latest scientific literature, and general information important to you.

You owe much of your medical security today to the past activities of organized medicine. You have an obligation to those who follow. Will you help carry on?

Your destiny is intimately related to the success of your county, state and national medical organizations.

OUR JOURNAL ADVERTISERS

The publication of The Journal entails considerable expense—more, in fact, than is realized from our membership's assessment. This expense is necessary and justified if the standard of The Journal of the Michigan State Medical Society is to be maintained.

Considerable financial contribution to the publication costs is made by our advertisers. The presentation of their wares, in The Journal, implies our endorsement of their products and is a testimonial to their reliability and character. Only products accepted and approved by the American Medical Association are publicized in The Journal.

Since our advertisers become partners of the members of the Michigan State Medical Society in The Journal publication, it behooves each physician to use these approved products and to make known to the advertiser the fact that his contribution is really appreciated.

Your especial attention is drawn to the list of our regular advertisers—those firms who, each month throughout the year, purchase space in the Journal. Your manifested appreciation will encourage more reliable firms to publicize their products in your publication and will enable your Editorial Board to continue a Journal of which we can all be proud.

The advertisers' financial contribution prevents an otherwise necessary increase in your State Society dues.

AN IMMUNIZATION PROGRAM

Some months ago, every physician in Michigan received a pamphlet setting forth the latest approved methods and technic of immunization. This pamphlet represented months of study and compilation. Its contents were approved by the Michigan State Medical Society, the Michigan branch of the American Academy of Pediatrics and the Michigan State Health Department.

The subject matter of this pamphlet represents a major portion of the activities of

the new Child Welfare Committee of the Michigan State Medical Society. Adherence to the principles set down in this brochure is essential to the active practice of preventive medicine, in which every physician should participate.

Your earnest attention to, and careful study of this work is urged upon every member of the Michigan State Medical Society. It was prepared and distributed for your convenience.

THE SEASON'S GREETINGS

As we draw near to the end of another year of activity, we review with considerable gratification the accomplishments of the past twelve months. Organized medicine has kept pace with scientific advancement, and has met with serious analysis its ever-increasing social and economic problems.

As we launch upon another year's endeavors, the Greetings of Christmas and New Year are extended to one and all.

May 1940 witness even a greater service, by the medical profession, to the citizens of Michigan—a service developing better health and prosperity to all.

GLASS HOUSES

Do not criticize the work of another physician to his patients. It is by no means improbable that, within a short period of time, he will have occasion to discuss with a patient of yours work about which you may have little reason to be proud, and may seize the opportunity to even the score with you. It is also conceivable that your patient may bring suit against you while his patient is content to return to him with your criticisms. Remember, too, that such disparaging remarks may become the basis for the filing of a counter suit for slander.—*The Roentgenologist in Court,* S. W. Donaldson, M.D.

NEW EXECUTIVE SECRETARY

The Genesee County Medical Society took a very progressive step, on October 25, 1939. It created the position of Executive Secretary. Sara Burgess was selected to fill this position. The new executive office will be located in Hurley Hospital, Flint. All correspondence for the Secretary, Treasurer, and general committees may be sent to the Executive Office.

Two county medical societies of Michigan now have executive secretaries—Genesee and Wayne.

Congratulations, Genesee County Medical Society, on this forward move. All success to your venture!

COUNTY SECRETARIES' CONFERENCE

January 21, 1940, is the date of the Annual County Secretaries' Conference. The meeting will be held as usual in Lansing, at the Olds Hotel, beginning at 10:00 a. m. and adjourning promptly at 4:30 p. m.

The morning session will be devoted to round table discussions on Relief Medicine, including the Afflicted-Crippled Child Acts, Group Medical Care (Michigan Medical Service), and similar matters of vital interest to every practitioner of medicine.

The unique feature of this year's Conference will be a joint meeting in the afternoon with all the health officers of the State, called to the Capital City by State Health Commissioner H. Allen Moyer, M.D.

Secretaries and executive secretaries of county medical societies are invited to attend, and are urged to bring their presidents or presidents-elect.

1940 CONVENTION

Detroit has been chosen by The Council as the place for the 1940 Annual Meeting of the Michigan State Medical Society. The dates: September 24, 25, 26, 27, 1940. The headquarters hotel will be the Book-Cadillac.

MICHIGAN MEDICAL SERVICE—A DIGEST

PART II

(Continuing from Page 963 of the November issue of THE JOURNAL, *this Article outlines the essential provisions of the Michigan Medical Service plan)*

Arrangement Between Physicians and Michigan Medical Service

Perhaps of most importance to physicians is the matter of the arrangement between the doctors of medicine and Michigan Medical Service.

The first fundamental principle adhered to in the development of the Michigan Medical Service plan was that the present relations between patients and physicians should not be changed except in the detail of making payments to physicians. The present essential principle of free choice of physician has been definitely maintained in the enabling act and in the provisions for the Michigan Medical Service plan. All doctors of medicine licensed to practice in the State of Michigan may register with Michigan Medical Service.

In other respects, the relations between the patient and physician will be the same as in private practice. In private practice physicians have an ethical and legal responsibility to their patients and this responsibility is not changed by Michigan Medical Service. Michigan Medical Service will not undertake to supervise the medical practices of physicians as this is the duty of the medical profession. Local Medical Advisory Committees of physicians will be formed by the medical profession in the community to supervise the relations between local physicians and Michigan Medical Service. District Medical Advisory Boards created by the medical profession will arbitrate questions dealing with professional relations.

Participation of Physicians

All doctors of medicine licensed and registered under the medical practice act of Michigan are eligible to provide services for the subscribers to the Michigan Medical Service plan. A Registration Application, which will be sent to all physicians, will indicate that the physician is willing to coöperate with Michigan Medical Service and to provide services for subscribers according to the terms and conditions of the Michigan Medical Service plan. The legal responsibility of physicians who register with Michigan Medical Service toward subscriber-patients will be the same as the present legal responsibility between physicians and patients.

No registration fee will be charged members of the Michigan State Medical Society, inasmuch as the Society has already met organization expenses and will contribute working capital. Non-member physicians will be expected to pay a registration fee equal to the per capita contribution already made on behalf of the physicians from the funds of the Michigan State Medical Society.

Fees

One of the most difficult problems in a medical service plan is the question of medical fees. The Council of the Michigan State Medical Society has given full consideration to this intricate problem.

A short listing of fees has been prepared to indicate the level of payments contemplated by Michigan Medical Service. Such a schedule of fees will be used as a guide by the Medical Advisory Committees in approving payments for services rendered. These fees represent the amounts now charged by physicians for patients in the limited income group eligible for enrollment. Qualified specialists, when called in consultation, will be paid a consultation fee.

The subscription rates on which the Michigan Medical Service plan is based have been determined in accordance with two major factors: (1) Equitable fees for services

*Part I of this Digest appeared in the November issue of THE JOURNAL, page 960.

to be rendered; (2) Ability to pay of the persons to be served. To be fair to both the public and the profession, equal weight was given to each factor. Every demand that subscription rates be lowered must face the necessity to pay lower fees; and every demand that higher fees be paid must face the necessity to charge higher subscription rates.

Services and Payments

On the commencement of services for a subscriber, the physician will be asked to send a notice to Michigan Medical Service in order that records pertaining to the subscriber may be checked. At the end of each month in which services have been rendered, the physician will send a report itemizing the services rendered. The report form required will be kept as short and simple as possible.

All reports of services must be received within ten days after the end of the month and failure to furnish a report will invalidate the claim for payment unless the delay could not have reasonably been avoided.

After deducting funds for administrative expenses and reserves, the available funds will be distributed pro rata to the physicians who have submitted reports of service, using the established fee schedule as a basis.

State-Wide Plan

Early in the development of the medical service plan, it was proposed that county medical societies operate plans on a county-wide basis and that the State Medical Society simply develop a central organization to assist and advise local medical societies. However, the Insurance Department of the State of Michigan recommended the establishment of a state-wide plan with one administrative organization, because of the desirability of uniform subscription rates throughout the state and the necessity for centralizing reserves.

In view of the position taken by the Insurance Department and to avoid duplicating administrative organizations and expenses, The Council proceeded with the development of a proposed state-wide organization which received full approval of the House of Delegates at the meeting in Grand Rapids on September 18, 1939.

Control Measures

Physicians have been keenly interested in the arrangements for supervising the rendering of services to subscribers, and the procedures to be used in making payments to physicians who have rendered such services. It is contemplated that, in each Councilor District, a Medical Advisory Board will be established to supervise, as may be necessary, the approval of bills for services rendered. Local Medical Advisory Committees may also be created to coöperate in this function.

A Medical Profession Plan

Physicians of Michigan should recognize that Michigan Medical Service is their own plan and that its success or failure will be largely dependent on their own actions. The provisions for the Michigan Medical Service plan have received the considered judgment of the Delegates and Councilors of the State Medical Society and embody the fundamental principles recognized as essential for a sound medical service plan. The administration of the plan will be in the hands of a Board of Directors, the majority of whom are practicing doctors of medicine thoroughly conversant with the problems of medicine.

The physicians of Michigan, by their cooperation and sympathetic participation during the initial period of placing the medical service plan into operation, will contribute immeasurably to the success of the plan. The Michigan Medical Service plan offers tremendous possibilities of serving as a real benefit both for persons in the low income group and for physicians.

The success of Michigan Medical Service will preclude the entrance of government or lay groups into the practice of medicine and will ensure the objective toward which the Michigan State Medical Society has been striving—provision of good medical care for all of our people.

Members of the Michigan State Medical Society are urged to familiarize themselves with the Michigan Medical Service plan and to coöperate with the Delegates and Councilors in their efforts to inaugurate a feasible plan of medical care for the limited income and relief groups.

Woman's Auxiliary

YULETIDE GREETING

The high season of the year is at hand when all of us have the opportunity to give greater thought to the blessings which have been bestowed upon us so generously. The holidays seem to be set aside for the purpose of appreciating more than ever our families, our relatives, our friends.

This pause, from the considerations of a troubled world, allows us a moment to say to all these friends and relatives: "May your Christmas be full of joy, and the New Year bring you Peace, Happiness and Prosperity." That is my wish for the members of the Woman's Auxiliary, and for the doctors of the Michigan State Medical Society.

Our country is free of war. With the help of the doctors and the Auxiliary, it shall be free of the taint of socialism. Our responsibility is to inform the people of the dangers of state-managed medicine, and of the benefits of voluntary group medical care, such as the Michigan State Medical Society program.

After the turn of the year, I am hoping that concentrated attention can be given to a dire need of the Woman's Auxiliary—a permanent secretary. I would like to affirm as one of my New Year's resolutions that I shall work unceasingly, with the help of other members of the Woman's Auxiliary, for the creation of this post. No successful organization carries out a long-term program without permanence in one or more of its offices, particularly in that of secretary.

Again, to the thousands of physicians' wives in Michigan, who are sincerely serving the needs of their physicians, we send sincere Christmas and New Year's greetings.

—MARY C. CHRISTIAN, *President.*

REPORT OF ANNUAL CONVENTION

The thirteenth annual meeting of the Woman's Auxiliary of the Michigan State Medical Society was held in the Pantlind Hotel, Grand Rapids, September 19 to 21.

The pre-convention meeting of the 1938-1939 Board was held Tuesday, September 19, at the Pantlind Hotel. Following the luncheon, Mrs. P. R. Urmston, president, called the meeting to order. The minutes of the previous meeting were read and approved. The chairmen of the standing committees gave informal reports and discussed the problems of their field of work.

A reception honoring Mrs. Rollo Packard of Chicago, national president, was held preceding the banquet, which more than one hundred Auxiliary members attended. Seated with Mrs. Packard at the speakers' table were: Mrs. P. R. Urmiston, president; Mrs. Harrison Collisi, State Convention chairman; Mrs. Roger Walker, vice president; Mrs. L. G. Christian, president-elect; Mrs. R. E. Scrafford, secretary-treasurer; and Mrs. Wm. Butler, co-chairman of the State Convention. Following dinner Mrs. Packard presented a definite challenge in her message, "Functions of the Auxiliary."

The annual meeting was held in the Swiss Room of the Pantlind Hotel, September 20, at 9:30 a. m. The meeting was called to order by the president, Mrs. P. R. Urmston. The address of welcome was

given by Mrs. Wm. Butler, co-chairman of the hostess auxiliary and response was made by Mrs. T. F. Andrews. The minutes of the previous meeting were read and approved. The treasurer's report, showing a balance of $796.50, was read and accepted. Mrs. H. J. Pyle, chairman of Registration and Credentials, reported thirty-four voting delegates with a total of 240 registrations. Reports from standing committee chairmen were read and placed on file. Those reporting were: Organization—Mrs. Roger Walker. Press—Mrs. Page, read by secretary. Legislation—Mrs. F. T. Andrews presented Dr. Foster, secretary of Michigan State Medical Society. Dr. Foster gave an up-to-the-minute account of the legislation affecting the medical profession. Public Relations—Mrs. Collisi. Revision—Mrs. Bond. The proposed amendments to the Constitution and By-Laws were read. It was moved by Mrs. Keagle, seconded by Mrs. Whitney, that the report be accepted. Motion carried. After much discussion all proposed amendments were approved and accepted with the exception of Article 4—Officers; Section 3, 4, 5, which was moved by Mrs. Wenger, seconded by Mrs. Pyle, to be laid on the table. Motion carried. Mrs. Robb moved, seconded by Mrs. Geib, that Article 5 be laid on the table. Motion carried. *Hygeia*—Mrs. Keagle. Program—Mrs. Jaennichin. Mrs. Urmston introduced Dr. Harvie, chairman of Advisory Board. He brought a brief message from the Medical Society and the Advisory Board. Mrs. Rollo Packard was present and spoke briefly on *Hygeia*. Mrs. Walker took the chair while Mrs. Urmston read her president's report and her report of the national convention in St. Louis. Mrs. Whitney gave the report of the Budget Committee. Mrs. Robb moved that at the next annual meeting, copies of the proposed budget for the coming year and copies of the treasurer's annual report be handed to members as they enter the meeting. Motion was seconded by Mrs. Whitney and carried. Mrs. Andrews, chairman of the Courtesy Resolutions, recommended letters be written in appreciation to the Shari Shop and to Mrs. Harrison Collisi, Convention chairman, also a letter to Mrs. John Page on her recent bereavement. The report of the Nominating Committee was given by Mrs. Sutton, chairman. The names presented were: Mrs. L. G. Christian, president; Mrs. Roger Walker, president-elect; Mrs. W. W. Bond, vice president; Mrs. W. J. Butler, treasurer. As there were no nominations from the floor these officers were unanimously elected. The reports of the county presidents were read and ordered placed on file. They were reported as follows: Bay, Mrs. Allen; Calhoun, Mrs. Wenke; Eaton, Mrs. Sassman; Ingham, Mrs. Vanderzalm; Jackson, Mrs. Alter; Genesee, Mrs. Willoughby; Kalamazoo, Mrs. Aldrich; Kent, Mrs. Butler; Newaygo, Mrs. Stryker; Oakland, Mrs. Sutton; Saginaw, Mrs. MacKinnon; Van Buren, Mrs. Kingard.

Mrs. Urmston introduced the newly elected officers for the year 1939-40. The gavel and president's pin were presented to Mrs. L. G. Christian, who, in turn, presented Mrs. Urmston her past president's pin. Mrs. Christian then took the chair. Wednesday noon, a luncheon at the Kent Country Club was attended by a record crowd. The long tables centered with artistically arranged mounds of fall fruits and vegetables were outstanding. Guests at the speakers' table were Mrs. Rollo Packard, Dr. Luce of Detroit, Dr. Harvie of Saginaw, Dr. Urmston of Bay City, Dr. Corbus and Dr. Torgenson of Grand Rapids, Dr. Foster and Wm. Burns. Following the luncheon, Mr. Lee A. White, of the *Detroit News*, gave a very interesting talk, "What Can We Believe."

The post-board meeting, following the luncheon, was called to order by the president, Mrs. L. G. Christian. She called on Mrs. Wm. Butler, who distributed blanks for the budget committee and gave instructions for their use during the year. The committee chairmen appointments were announced by Mrs. Christian. The meeting was adjourned at 4:30 o'clock. A Furniture Museum tour followed this meeting.

Wednesday evening, from 6:00 to 8:00 o'clock, an informal hors d'oeuvres party was enjoyed by auxiliary members and guests in the Club Lounge. Following the evening lecture by Dr. Rock Sleyster, dancing was enjoyed in the Grill Supper Club.

BRIEFS

Eaton County.—The first meeting of the year for the Woman's Auxiliary to the Eaton County Medical Society was held Thursday, October 14, 1939. Following the dinner, at Fisher's Party Rooms, the meeting was called to order by the president, Mrs. F. W. Sassaman.

The following committees were appointed by the chair: Social—Mrs. Newark, Charlotte; Membership—Mrs. Huber and Mrs. Moyer, Charlotte; Press—Mrs. Brown, Charlotte; Program—Mrs. Stucky and Mrs. Anderson, Charlotte; Public Relations—Mrs. Wilensky, Eaton Rapids; *Hygeia*—Mrs. Paine, Grand Ledge; Necrology—Mrs. Burdick, Grand Ledge; Flower—Mrs. Rickerd, Charlotte, and Mrs. VanArk, Eaton Rapids.

Jackson County.—Meeting of October 17. Speakers: Dr. J. H. Ahronheim and Mr. Merrill Hewitt.

Kalamazoo County.—Meeting of October 12. Election of officers: President, Mrs. Ralph G. Cook; President-elect, Mrs. Kenneth L. Crawford; Vice-President, Mrs. Sherman Gregg; Secretary, Mrs. Keith L. Bennett; Treasurer, Mrs. Robert J. Armstrong.

Kent County.—Meeting of October 11. Speakers: Mrs. O. H. Gillett; Dr. Luther Carpenter, and Rabbi Jerome Folkmann. Mrs. Alexander M. Campbell was elected president of the Kent County Woman's Auxiliary.

Monroe County.—Meeting of October 12. Appointment of committees was made, and program for the year was discussed.

Saginaw County.—Meeting of October 24. Luncheon in honor of the officers of the State Woman's Auxiliary. Mrs. Frederick J. Pietz was general chairman. Eighty-five present.

DIRECTORS OF MICHIGAN MEDICAL SERVICE MEET

The first meeting of the Directors of Michigan Medical Service was held on November 30 in Lansing. Drs. H. H. Cummings, O. D. Stryker, and R. H. Holmes, new members of the Executive Committee of The Council, were elected to the Board of Directors. Mr. Wm. J. Norton, chairman of the Children's Fund of Michigan, was also elected as a representative of the public. Final arrangements for the early inauguration of Michigan Medical Service will be conducted by the Board of Directors.

MICHIGAN'S DEPARTMENT OF HEALTH

HENRY A. MOYER, M.D., Commissioner
LANSING, MICHIGAN

COUNTY HEALTH DEPARTMENT ORGANIZATION

Cass County Board of Supervisors voted, on October 24, to establish a full time county health department, thus becoming the 61st Michigan county to provide this service. It is expected that the new department will be organized about January 1, 1940.

Washtenaw County Board of Supervisors, which voted, on October 20, to establish a county health department, reversed their decision a week later. The vote against organization at this time was occasioned by lack of funds.

DR. E. L. McQUADE JOINS STATE DEPARTMENT STAFF

Dr. Edwin L. McQuade, former director of rural health in the Virginia State Health Department, has joined the staff of the Department's Bureau of Epidemiology. He will specialize in typhoid control, directing the Department's program for the detection and control of typhoid carriers.

Dr. McQuade received his M.D. in 1927 and completed his doctorate in public health at Johns Hopkins University in 1931. In addition to a short period in private practice in Nova Scotia, he has served as county health officer in Virginia, instructor in epidemiology at Johns Hopkins, and associate professor of preventive medicine at the University of Virginia.

ONTONAGON-BARAGA HEALTH OFFICER APPOINTED

Dr. Rolla J. Shale of Akron, Ohio, has been appointed director of the Ontonagon-Baraga Health Department, assuming his duties November 13. His headquarters will be at Ontonagon. Dr. Shale has served as director of Weld County Health Department at Greeley, Colorado, and as school physician at Cleveland Heights, Ohio. He received his M.D. at Johns Hopkins in 1912, practiced his profession for 19 years in Cleveland Heights, and completed his training for the master's degree in public health administration at the University of Michigan in 1938.

HILLSDALE COUNTY DIRECTOR RESIGNS

Dr. E. G. McGavran has notified the State Health Commissioner of his resignation as Director of the Hillsdale County Health Department. The resignation became effective October 20. Dr. McGavran's successor has not yet been appointed.

DR. A. E. LAUTZ TO DIRECT NUTRITION DIVISION

Amalia E. Lautz, Ph.D., is the newly appointed chief of the Nutrition Division recently organized by the Michigan Department of Health. This division will function under the Bureau of Maternal and Child Health. Miss Elizabeth Whipple is also attached to the new division as nutrition consultant. Dr. Lautz comes to Michigan from Butler University, where she was assistant professor of foods and nutrition. She received her Ph.D. at Cornell University. The services of the nutrition staff will be available to health officers in the development of local nutrition programs.

ASTHMA FROM YOUR FUR COAT

The cheaper your furs, the more expensive they may be. In the pocket of many fur garments there is an expensive but invisible bill for medical services. Efforts to make cheap furs appealing or to resemble desirable types call for the use of chemicals not used on good furs. Chief among these are fur dyes. The same chemicals are used in fur dyeing that formerly were widely used for dyeing the head hair of humans. So many cases of skin disease and asthma developed among persons with dyed hair and other persons who applied the dye that medical associations long have warned the public against this type of cosmetic.

The chief offender bears the unpronounceable name of "paraphenylendiamine," known in the trade as "ursol" but sold as an ingredient in many dyes under trade names that do not disclose its presence.

Long after a fur article has been dyed and thoroughly dried, the wearer may suffer from a disturbing shortness of breath, wheezing and coughing, associated at times with swelling of the lips, cheeks, eyes and neck tissues, and with or without inflammation of the skin.

While fur workers are the chief victims of this disease, in the aggregate the total number in the general public is much larger. Far more women are afflicted than men, since they are the chief wearers of furs.

Obviously fur asthma almost entirely disappears during the summer months. Usually the victim readily may associate asthmatic attacks with furs, for the difficulty in breathing and shortness of breath appears only when the fur is worn or near at hand. Occasionally persons who do not wear furs, but are closely associated with others who do, acquire this disease. A few persons become so sensitive that the mere presence of a dyed fur in a room is sufficient to incite an attack.

Dr. Carey P. McCord, Director of the Bureau of Industrial Hygiene of the Michigan Department of Health, states, "While the chief concern of occupational hygiene is the protection of fur workers against this disease, the entire world of cheap fur wearers should be alert to the possibilities of harm. Now is the time of fur sales, renovating and repairing of furs. Should any asthma appear not accounted for by usual causes, suspicion should point to dyed furs as a possible cause."

If a dyed fur is suspected, a few hairs should be clipped from the fur and should be applied to the skin in some sensitive area by a physician carrying out what is known as a "skin patch test." If, after wearing this patch test for a few hours the skin beneath is irritated or swollen, a diagnosis is likely to be made of "fur sensitivity." The asthma, skin swelling and dermatitis are all manifestations of this sensitivity.

CHROMIUM IN DRINKING WATER

In most towns and all cities drinking water supplies are protected against a content of dangerous germs by the addition of chemicals, chiefly chlorine. This laudable and praiseworthy health protection is supervised by state, county and municipal public health agencies. On the other hand, year by year proposals are made to add other chemicals to water supplies, including, at times, drinking water systems, industrial water supplies and water systems for special purposes such as for fire protection. By no means are all of these proposals safe or commendable. A growing practice is to add small quantities of chromium in the form of chromates to water supplies for the purpose of preventing the corrosion of pipes and metal machinery. Where introduced into drinking water supplies, the quantity added is so low as to eliminate any ready prospect of poisoning. On the other hand, for industrial purposes, the quantity of chromium may be much larger.

Lately the Federal Department of Agriculture has made a ruling that in connection with the cooling of air by water sprays, this chemical may not be present in the water if the air so cooled later is to circulate about foodstuffs. It naturally follows that if foods may acquire enough chromium to injure the consumer, the breather of the same air might be damaged. Therefore, any such use of chromium in connection with air conditioning for human comfort is open to suspicion. While the quantity proposed for drinking water supplies is minimal, it may be believed that accidental conditions may arise that would lead to poisoning from water drinking. One milligram of chromium per day taken into the human body is the maximum that may be tolerated without possible injury to some persons. Since a milligram is only one sixty-fifth of a grain, this approximates that amount that might be placed on a pin head.

Dr. Carey P. McCord, Director of the Bureau of Industrial Hygiene of the Michigan Department of Health, states, "The use of chromium in circulating industrial water supplies opens up a definite opportunity for wholesale injury if there be any possible cross connections between the plant's drinking water supply and water systems intended only for industrial uses. Wherever chromium is used in industry in water systems, careful check should be made to eliminate the possibility of accidental transference to water intended for drinking purposes."

TWO THOUSAND WAYS TO MAKE A LIVING

If you were looking for a job and would accept any type of employment where one or more persons are already at work, it might be necessary to send out 175,000 letters of application. This number of employers is regarded as the minimum for the State of Michigan as a result of an inquiry made by the Bureau of Industrial Hygiene of the State of Michigan. This number of different places of employment includes, along with factories large and small, department stores and transportation companies, barber shops, small markets, news stands, many thousands of employments in households as maids or cooks, as chauffeurs and in various forms of self employment.

The number of places of employment in the state where the workers are above 8 or 10 in number approximates 17,500. The number of plants in which more than 1,000 persons carry out their duties probably does not exceed 100.

The number of different trades or jobs plied by Michigan workers far outnumbers the total in places of factory employment. At least 2,000 distinct varieties of jobs are occupied by Michigan workers. Alphabetically these range from accordion makers to zooglers. If packing house employes may be classed as "abattoir workers" they then perhaps head the alphabetical list of types of employment in Michigan.

The commonest health exposure in Michigan industry is noise. Second on the list comes deficient illumination. While the elimination of all industrial noise is most difficult, the provision of sufficient illumination readily may be accomplished. These two items stand at the top of the list of fifty-seven practical health exposures detected in an investigation of 700 representative plants in the State of Michigan made by the Bureau of Industrial Hygiene.

General News and Announcements

"Committee on Industrial Health" is the new name for the Committee on Occupational Diseases and Industrial Health.

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Congratulations go to the Muskegon County Medical Society, which forwarded a check to the State Society covering 1940 dues for all its members plus two new ones! Thus, this progressive County Medical Society becomes the first member of the "One Hundred Percent Club of 1940."

* * *

The Journal of the American Medical Association carried an article in its issue of October 14, 1939, by John R. Rodger, M.D., Bellaire, Michigan, entitled "An Unsuccessful Method of Birth Control."

The issue of November 4, 1939, contained an article on "A Device for Turning the Frame Patient" by Homer Stryker, M.D., of Ann Arbor.

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O. D. Stryker, M.D., Fremont, Speaker of the M.S.M.S. House of Delegates, announces the appointment of the following to the Advisory Committee on Nurses Training Schools: A. L. Arnold, Jr., M.D., Owosso, Chairman; W. C. Ellet, M.D., Benton Harbor; E. A. Oakes, M.D., Manistee; F. J. O'Donnell, M.D., Alpena; P. A. Riley, M.D., Jackson; and A. E. Stickley, M.D., Coopersville.

* * *

Mr. R. L. McCabe, Detroit, recently a member of the Michigan State Board of Pharmacy, and the owner of a professional pharmacy, will conduct a course of weekly lectures with demonstrations on sickroom and surgical supplies for the Senior students at the College of Pharmacy of Wayne University.

* * *

Dr. Burt R. Shurly of Detroit was the guest of honor at the annual meeting of the American Academy of Ophthalmology and Otolaryngology on October 8-14. The meeting was held in Chicago. Dr. Shurly was presented with the Society's medal. He has been long identified with not only medical education but education in general, inasmuch as he has been for many years a member of the Detroit Board of Education. Dr. Shurly is at the head of the Shurly Hospital, Detroit.

* * *

The Section N of the American Association for the Advancement of Sciences, which is devoted to medical sciences, will give an extensive symposium on the blood, heart and circulation. This symposium is by the most outstanding workers in hematology and physiology in the United States. The program, which will be given at Room 100, Administration Building, Columbus, Ohio, beginning December 27, is too extensive to give in detail. Further particulars may be had by addressing Dr. Malcolm H. Soule of the Medical Faculty of the University of Michigan, Ann Arbor.

* * *

"Pay-Your-Doctor Week" inaugurated last year by the California Bank in Los Angeles on a local basis struck a responsive chord in other sections of the country with the result that the week of November 26 to December 2 of this year has been

designated as national "Pay-Your-Doctor Week." The plan is to have one bank in each city sponsor and publicize "Pay-Your-Doctor Week" through newspapers, radio, outdoor advertising, and other advertising media. The idea should be a valuable aid in stimulating many to pay their doctor who might otherwise pursue the common tendency to let the doctor wait indefinitely.

* * *

Doctor, remember your particular friends, the exhibitors at your Annual Convention, when you have need of equipment, appliances, medicinal supplies and service. Here are ten of the firms which helped make the 1939 Convention such a great success:

The Borden Company, New York
The Burrows Company, Chicago
Cameron Surgical Specialty Company, Chicago
S. H. Camp Company, Jackson, Michigan
Coca-Cola Company, Atlanta, Georgia
Cottrell-Clarke, Inc., Detroit
R. B. Davis Company, Hoboken, New Jersey
Dazor Manufacturing Company, St. Louis, Missouri
Detroit Creamery Company, Detroit
Detroit First Aid Company, Detroit

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Wilfrid Haughey, M.D., Battle Creek, represented the Michigan State Medical Society on the Panel Discussion of "An Over-View of Our Problems and Program of the Medical Treatment of Crippled Children." The foregoing subject was presented by Mr. Hugh E. Vande Walker, Chairman of the Michigan Crippled Children Commission, at the annual meeting of the Michigan Society for Crippled Children held in Battle Creek on November 17 and 18, and a panel discussion was held with the following participating: W. S. Ramsey, M.D., represented the Crippled Children Commission; Robert Greve represented the Hospital Association; C. W. Brainard, M.D., represented the Orthopedic Surgeons; and Miss Enid Bailey represented the convalescent home.

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The House of Delegates, on September 18, 1939, elected the following physicians to Emeritus Membership in the Michigan State Medical Society: James B. Bradley, M.D., Eaton Rapids; Don M. Campbell, M.D., Detroit; George L. G. Cramer, M.D., Owosso; Wm. M. Donald, M.D., Detroit; A. G. Holbrook, M.D., Coldwater; John H. Kellogg, M.D., Battle Creek; Charles C. Landon, M.D., Battle Creek; Stanley G. Miner, M.D., Detroit; Wm. H. Riley, M.D., Battle Creek; and Rollin H. Stevens, M.D., Detroit.

The House of Delegates also elected the following to Retired Membership in the M.S.M.S.: Milan Coburn, M.D., Coopersville; Henry G. Glover, M.D., and Walter E. Spicer, M.D., of Jackson. George C. Hafford, M.D., of Albion, an Emeritus Member of the Michigan State Medical Society, was nominated for Affiliate Fellowship in the American Medical Association. Congratulations!

* * *

At the annual meeting of the American College of Surgeons the following Michigan hospitals in the Detroit area were placed on the approved list: Alexander Blain, Charles Goodwin Jennings, Chenik, Children's Hospital, Delray General, Detroit Tuberculosis Sanitarium, East Side General, Edyth K. Thomas, Evangelical Deaconess, Florence Crittenton, Grace, Harper, Henry Ford, Herman Kiefer, Lincoln, Michigan Mutual, Mount Carmel Mercy, Parkside, Providence, Receiving, with Redford Branch, St. Josephs, St. Marys, Shurly, Trinity, United States Marine, Women's, Eloise, Cottage Hospital at Grosse Pointe, St. Francis, Highland Park General, William H. Maybury Sanatorium, Sidney A. Sumby at River Rouge, Sunnybrook,

Royal Oak and Wyandotte General. Four Michigan hospitals were included in the College of Surgeons list of 307 approved general hospitals which are conducting approved cancer clinics. They are the Battle Creek Sanitarium, Mercy Hospital at Bay City, Grace Hospital, Detroit, and Hurley Hospital, Flint.

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The American College of Surgeons at the annual meeting in Philadelphia, October 16 to 19, admitted a number of new applicants to fellowship. From Michigan are the following: Leon C. Bosch, Grand Rapids; Harvey F. Brown, Detroit; Chauncey G. Burke, Pontiac; Thomas T. Callaghan, Detroit; Meyer O. Cantor, Detroit; Clifford P. Clark, Flint; F. Bruce Fralick, Ann Arbor; Charles H. Frantz, Grand Rapids; George Hammond, Ann Arbor; E. Howard Hanna, Detroit; Edwin L. Hansen, Battle Creek; Ernest C. Hansen, Manistee; Herbert W. Harris, Ann Arbor; I. J. Hauser, Detroit; J. A. Kurcz, Detroit; C. R. Lam, Detroit; B. H. Larsson, Detroit; E. C. Long, Monroe; O. W. Pickard, Detroit; W. J. Smith, Cadillac; B. F. Sowers, Benton Harbor; Wallace H. Steffensen, Grand Rapids; Cullen E. Sugg, Grand Rapids; F. W. Tamblyn, Lansing; Charles F. Thomas, Port Huron; and Vincent J. Turcotte, Detroit.

For the best surgical case history, Dr. Wilbur McLean of Detroit was awarded a life membership in the College equivalent to $500 in remitted dues. Dr. Robert J. Williams, of Monroe, received honorable mention for the excellence of his case histories.

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L. Fernald Foster, M.D., Bay City, addressed the Sebewaing Rotary Club on August 1, using as his subject "Medical Service Plans."

"Federalized Medicine" was Doctor Foster's subject for his address before the Jonesville Lions Club on September 5th.

Drs. Henry A. Luce, Henry R. Carstens, A. S. Brunk, and Mr. Wm. J. Burns and Mr. John D. Laux presented the Michigan Medical Service plan before the annual convention of the Michigan Conference of Social Work in Detroit on October 5th.

Wm. J. Burns discussed "Federalized Medicine" at the meeting of the Lions' Club of Lansing on October 10.

L. Fernald Foster, M.D., spoke to the Valparaiso University Guild of Saginaw on October 17, using "Michigan Medical Service" as his subject.

Roy H. Holmes, M.D., Muskegon, addressed the Lansing Service Club on the subject of "Syphilis" on October 23.

Wm. J. Burns addressed the Grand Rapids Breakfast Club on November 8, discussing "Michigan Medical Service."

L. Fernald Foster, M.D., presented the plan of "Michigan Medical Service" at the 1939 Annual Conference of Secretaries of State Medical Societies held at the AMA Headquarters in Chicago on November 17 and 18.

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The regular autumn meeting of the Michigan Pathological Society was held on October 14, 1939, in Saginaw, Michigan, at the General Hospital and at the residence of Dr. Oliver W. Lohr. General exhibits featured the afternoon meeting followed by dinner at the Hospital and scientific and business meeting in the evening at the home of Dr. Lohr. Thirty were in attendance. Dr. O. W. Lohr, president, presided. The subject of the scientific program was "Bone Pathology with Special Emphasis on Tumors." The following cases were presented: "Classification of Bone Tumors" by Dr. Frank

Hartman; "Ewing Tumor," "Myeloma of Jaw Bone," "Osteogenesis Imperfecta" by Dr. Kerr; "Lymphosarcoma" by Dr. M. R. Oldt; "Osteochondromatosis" by Dr. J. H. Ahronheim; "Squamous Cell Carcinoma Primary in Middle Ear with Metastasis to Mastoid," "Giant Cell Tumor of Mandible," "Fibrosarcoma of Femur—Possible Primary in Soft Tissues of Forearm" by Dr. O. A. Brines; "Ossifying Fibroma of Jaw" by Dr. Ruth Wanstrom; "Dural Ossification and Osteoma" by Dr. G. Steiner; "Osteogenic Sarcoma of Femur with Autopsy Report" by Dr. C. H. Binford; "Bone Cyst of Humerus," "Solid Type Osteitis Fibrosa Cystica of Foot" by Dr. C. I. Owen; "Bone Sarcoma Following Injury," "Metastatic Neurocytoma of Eye to Bone," "Thyroid Tumor" (Bone Sarcoma?) by Dr. G. L. Bond.

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New Officers of County Medical Societies

Genesee County: President, George R. Goering, M.D.; President-Elect, Clifford W. Colwell, M.D.; Secretary, John S. Wyman, M.D.; Treasurer, Vaughn Morrissey, M.D., Medico-legal Officer, Herbert E. Randall, M.D.; Delegates to M.S.M.S., Frank E. Reeder, M.D., George J. Curry, M.D., and Donold R. Brasie, M.D., all of Flint.

Huron-Sanilac County: President, J. B. Henderson, M.D., Pigeon; Vice President, H. H. Learmont, M.D., Croswell; and Secretary-Treasurer, E. W. Blanchard, M.D., Deckerville.

Lenawee County: President, P. B. Hardy, M.D., Tecumseh; Vice President, B. Patmos, M.D., Adrian; Secretary-Treasurer, E. T. Morden, M.D., Adrian; Delegate, A. W. Chase, M.D., Adrian; Alternate Delegate, B. Patmos, M.D., Adrian.

Monroe County: President, W. W. Bond, M.D., Monroe; Vice President, Edgar C. Long, M.D., Monroe; Secretary-Treasurer, Florence Ames, M.D., Monroe; Directors, V. L. Barker, M.D., Monroe, and R. T. Ewing, M.D., Monroe; Censor, J. J. Siffer, M.D., Monroe; Delegate, D.C. Denman, M.D., Monroe; Alternate Delegate, J. H. McMillin, M.D., Monroe.

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County Society Meetings

Berrien County: October 18—Dowagiac. Speaker: R. L. Sensenich, M.D., South Bend, Ind. November 9—St. Joseph. Speaker: Geo. S. Livingston, M.D., Chicago.

Calhoun County: Battle Creek. November 7. Speaker: Prof. Polya of Budapest, Hungary.

Gratiot-Isabella-Clare: November 16—Alma. Speaker: Alexander M. Campbell, M.D., Grand Rapids. December 21—Alma. Annual Christmas Party, joint meeting with Dental Society. Speaker: Wm. J. Burns.

Ingham County: October 17—Lansing. Speaker: Carl V. Weller, M.D., Ann Arbor.

Jackson County: October 17—Jackson. Speaker: Harold Henderson, M.D., Detroit.

Kalamazoo County: October 17—Kalamazoo. Speaker: F. Bruce Fralick, M.D., Ann Arbor.

Lenawee County: September 26—Adrian. Speaker: Maurice Schnitker, M.D., Toledo, O. October 17—Adrian. Speaker: Carey P. McCord, M.D., Detroit.

Livingston County: November 3—Howell. Speakers; L. G. Christian, M.D., A. B. Mitchell, M.D., H. A. Miller, M.D., and Wm. J. Burns, all of Lansing.

Muskegon County: October 20—Muskegon. Speaker: Lee A White, of *Detroit News.*

Ontonagon County: October 4—Ontonagon.

Speaker: Alexander M. Campbell, M.D., Grand Rapids.

Ottawa County: Holland—October 10. Speaker: John R. Pedden, M.D., Grand Rapids.

St. Clair County: October 24—Port Huron. Speaker: H. W. Carter, M.D., Sarnia, Ont.

Wayne County: October 23—Speakers: "Medical-Adjusters Commission"; H. B. Garner, M.D., L. J. Carey, LL.B., F. C. Vieson, LL.B., Frank McCormick, M.D., Earl G. Krieg, M.D., and E. Dean Alexander, LL.B. October 30—"General Practitioners Night" Panel Discussion on Heart Disease was participated in by Drs. Leslie T. Colvin, R. L. Novy, Harry B. Schmidt, F. Janney Smith, E. D. Spaulding, and Walter Wilson, Sr. Douglas Donald, M.D., was Chairman. November 6—Speaker: Clarence F. G. Brown, M.D., Chicago.

West Side Medical Society (Detroit): October 19—Detroit. Speakers: Harry A. Pearse, M.D., Gaylord S. Bates, M.D., and John G. Mateer, M.D.

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Michigan Physicians Honored by American College of Surgeons

Don Wilbur McLean ,M.D., Detroit, was awarded Life Membership in the American College of Surgeons for presenting the best surgical case history at the 1939 Annual Convention of the College in Philadelphia. The award is equivalent to $500 in remitted dues. Robert J. Williams, M.D., of Monroe, tied for fourth. The physicians from Michigan who were elected to the College of Surgeons include Drs. Leon C. Bosch, Grand Rapids; Harvey F. Brown, Detroit; Chauncey Greeley Burke, Pontiac; Thomas T. Callaghan, Detroit; Meyer O. Cantor, Detroit; Clifford P. Clark, Flint; F. Bruce Fralick, Ann Arbor; Charles H. Frantz, Grand Rapids; E. Howard Hanna, Detroit; George Hammond, Ann Arbor; Edwin L. Hansen, Battle Creek; Ernest C. Hansen, Manistee; Herbert W. Harris, Ann Arbor, I. Jerome Hauser, Detroit; Joseph A. Kurcz, Detroit; Conrad R. Lam, Detroit; Bror Hjalmar Larsson, Detroit; Edgar C. Long, Monroe; Don Wilbur McLean, Detroit; Orlando W. Pickard, Detroit; W. Joe Smith, Cadillac; Bouton F. Sowers, Benton Harbor; Wallace H. Steffensen, Grand Rapids; Cullen E. Sugg, Grand Rapids; F. Wendell Tamblyn, Lansing; Charles F. Thomas, Port Huron, Vincent J. Turcotte, Detroit, and Robert J. Williams, Monroe.

IN MEMORIAM

C. D. Mulder, M.D.

Dr. Cornelius D. Mulder of Spring Lake, Michigan, died after an illness of two years. He was born in Spring Lake, in 1874, graduated from Hope College in 1899 and from the Medical College of the University of Michigan in 1903. He had practiced medicine in the vicinity of Spring Lake for 36 years, and was a member of the staff of the Spring Lake Hospital and the Hackley Hospital at Muskegon. Dr. Mulder was also a trustee of Hope College and Western Theological Seminary for many years, as well as vice president of the State Bank of Spring Lake. He leaves his wife, Harriet; two daughters, Mrs. Herman Kruizenga and Mrs. Robert Kruizenga; also three sisters, the Misses Ella, Cora, and Mary Mulder; and a brother, John, of Spring Lake.

THE DOCTOR'S LIBRARY

Acknowledgment of all books received will be made in this column and this will be deemed by us a full compensation to those sending them. A selection will be made for review, as expedient.

THE 1939 YEAR BOOK OF GENERAL MEDICINE. Edited by George F. Dick, M.D., J. Burns Amberson, Jr., M.D., George R. Minot, M.D., S.D., F.RC.P. (Edinburgh and London), William B. Castle, M.D., A.M., M.D. (Hoh.), Utrecht William D. Stroud, M.D., George B. Eustermann, M.D. The Year Book Publishers Incorporated, 304 South Dearborn Street, Chicago. The price of this volume is $3.00.

* * *

AN INTRODUCTION TO MEDICAL MYCOLOGY. By George M. Lewis, M.D., Associate and Assistant Attending Dermatologist, New York Postgraduate Medical School and Hospital, Columbia University; Instructor in Medicine, Cornell University, and Mary E. Hopper, M.D., Assistant in Mycology, Skin and Cancer Unit, New York Postgraduate Medical School and Hospital, Columbia University. 333 pages, 71 full page plates, $5.50 postpaid. 304 S. Dearborn Street, Chicago: Year Book Publishers, 1939.

A unique work on an important subject.

* * *

THE 1939 YEAR BOOK OF RADIOLOGY. Edited by Charles A. Waters, M.D., Associate in Roentgenology, Johns Hopkins University; Associate Editor, Whitmer B. Firor, M.D., Assistant in Roentgenology, Johns Hopkins University; and Ira I. Kaplan, B.Sc., M.D., Director, Division of Cancer, Department of Hospitals, New York City. Chicago: The Year Book Publishers, 1939.

The editors and publishers are to be commended on their splendid efforts in presenting the latest developments in the various branches of medicine. We have had occasion to review the former editions. The present yearbook of Radiology is fully equal to its predecessors.

* * *

THE ROMANCE OF PROCTOLOGY, which is the story of the history and development of this much neglected branch of surgery from its earliest times to the present day, including brief biographic sketches of those who were pioneers. By Charles Elton Blanchard, M.D., 1938, Medical Success Press Publishers, Youngstown, Ohio.

The nature and subject matter of this book are implied in the title.

* * *

CLINICAL DIAGNOSIS BY LABORATORY METHODS. By James Campbell Todd, Ph.B., M.D., Late Professor of Clinical Pathology, University of Colorado, School of Medicine; and Arthur Hawley Sanford, A.M., M.D., Professor of Clinical Pathology, University of Minnesota (The Mayo Foundation); Head of Division on Clinical Laboratories, Mayo Clinic. Ninth Edition, thoroughly revised. 841 pages with 368 illustrations, 29 in colors. Philadelphia and London: W. B. Saunders Company, 1939. Cloth, $6.00 net.

This edition is the result of thorough revision. When there is call for nine editions of a work within thirty years, this fact alone is sufficient evidence of the value of the work. The laboratory methods in clinical diagnosis have gone a long way towards making medicine a more exact science.

* * *

THE PHYSIOLOGICAL BASIS OF MEDICAL PRACTICE, A Univerity of Toronto Text in Applied Physiology. By Charles Herbert Best, M.D., D.Sc. (Lond.), F.R.S., F.R.C.P. (Canada), Professor and Head of Department of Physiology, Associate Director of the Connaught Laboratories, Research Associate in the Banting-Best Department of Medical Research, Univ. of Toronto; and Norman Burke Taylor, M.D., F.R.S. (Canada), F.R.C.S. (Edin.), F.R.C.P. (Canada), M.R.C.S., (Eng.), L.R.C.P. (Lond.), Professor of Physiology, University of Toronto. Second Edition. Baltimore: The Williams & Wilkins Company, 1939.

The importance of normal physiology as a basis for all medical and surgical procedure is becoming more recognized. The value of a work such as this becomes inestimable. It is broad in its appeal, namely, to the whole field of medicine and surgery, and its specialties. This work is basic to every department of medical science, and now that it has been revised, no one who wishes to practice scientific medicine can afford to be without it.

JOUR. M.S.M.S.

THE RECTUM AND COLON. By E. Parker Hayden, A.B., M.D., F.A.C.S., Assistant in Surgery in the Harvard Medical School, Boston; Assistant Surgeon and Chief of Rectal Clinic, Massachusetts General Hospital, Boston. Illustrated with 169 engravings, 434 pages, cloth, $5.50. Philadelphia: Lea & Febiger, 1939.

This work deals with the surgical treatment of diseases of the rectum and colon. It is a monograph presenting practices and views of the author. The text is well illustrated by photographs and drawings. It is highly recommended as an authoritative and up to date work on the subject.

* * *

PSYCHOBIOLOGY AND PSYCHIATRY.—A textbook of Normal and Abnormal Human Behavior: By Wendell Muncie, M.D., Associate Professor of Psychiatry, Johns Hopkins University; Assistant Psychiatrist, Henry Phipps Psychiatric Clinic, Johns Hopkins Hospital. With a Foreword by Adolf Meyer, M.D., Henry Phipps Professor of Psychiatry and Director of the Department of Psychiatry, Johns Hopkins University. With 69 illustrations. St. Louis: The C. V. Mosby Company, 1939.

* * *

TEXTBOOK OF NERVOUS DISEASES. By Robert Bing, Professor of Neurology, University of Basel, Switzerland, Translated and Enlarged by Webb Haymaker, Assistant Clinical Professor of Neurology and Lecturer in Neuro-Anatomy, University of California. From the Fifth German Edition. With 207 Illustrations, including 9 in color. St. Louis: The C. V. Mosby Company, 1939.

The above works might be considered companion volumes. They will, of course, grace the library of the psychiatrist. However, since the scope of medicine has been broadened to include mental hygiene, the general practitioner can no longer look upon the subject of border-line cases as beyond his field of interest. These works are authoritative in their field which entitles them to the consideration of the profession. Attractively bound and clearly written, they will be found works of practical value, which no doctor who comes in contact with cases of nervous and mental disease can afford to be without.

* * *

TREATMENT IN GENERAL PRACTICE. Two volumes, price $7.50. Boston: Little, Brown & Co., 1939.

While no names appear on the cover of this work as author or compiler, the work is nevertheless unique. It is the result of an interesting experiment by the *British Medical Journal* which consisted in the publication of articles on medical treatment by well known clinical teachers who were chosen as being thoroughly familiar with the subject written about. The two volumes here presented comprise a series of articles. Their popularity in Great Britain has been assured and we bespeak a like popularity now that the volumes on treatment appear for the first time in the United States. In the matter of prescriptions, the apothecary instead of the metric system has been adopted throughout. The two volume work is highly commended to the medical profession.

* * *

MENTAL THERAPY, STUDIES IN FIFTY CASES. By Louis S. London, M.D., Formerly Passed Assistant Surgeon (R) United States Public Health Service; Medical Officer United States Veterans Bureau; Assistant Physician Central Islip State Hospital, Central Islip, New York, and Manhattan State Hospital, Wards Island, New York. New York: Covici, Friede Publishers, 1937.

These volumes cannot be of much help to the general practitioner. In the main, it is feared that the value of psychoanalysis has received a negative impulse rather than a positive one when interpreted by the average doctor of medicine. Psychoanalysis as developed by Freud has been a distinct contribution in the understanding of the human being.

The attempt to cover the whole field of the teachings of Freud, Stekel, Adler and others in thirty pages of reading material is too great an under-

taking for that amount of space. It leads to confusion on the part of the physician who has not had a previous extensive psychoanalytic training.

The remainder of the two volumes is given over to the histories of fifty cases. These case reports form interesting reading to the average doctor of medicine, but it is felt that his respect for psychoanalysis will not be increased after his period of reading.

* * *

OBSTETRICAL PRACTICE. By Alfred C. Beck, M.D., Professor of Obstetrics and Gynecology, Long Island College of Medicine; Obstetrician and Gynecologist-in-Chief, Long Island College Hospital, Brooklyn. More than one thousand illustrations. Second Edition. Baltimore: The Williams & Wilkins Company, 1939. Price, $7.00.

This work contains up to date account of the physiology of reproduction as well as results of recent research on the embryological phases. The subject of the physiology of lactation has been revised to conform with the results of recent studies in this field. The author has written chapters in the former edition on toxemia and abortion. The work will be found a very practical book on the subject of Obstetrics, Pre-management and Post-management. The author has used illustrations with a telling effect.

* * *

SYNOPSIS OF PEDIATRICS. By John Zahorsky, A.B., M.D., F.A.C.P., Professor of Pediatrics, St. Louis University School of Medicine, and Pediatrician in Chief to the St. Marys Group of Hospitals; Fellow of the American Academy of Pediatrics. Assisted by T. S. Zahorsky, B.S., M.D., Instructor in Pediatrics, St. Louis University School of Medicine, and Assistant Pediatrician to the St. Marys Group of Hospitals. Third edition, St. Louis: The C. V. Mosby Company, 1939.

This is essentially a synopsis and not a textbook on Pediatrics. Within the scope of 430 pages, the authors have accomplished a very satisfactory book for convenient reference or review. The entire subject has been covered in brief.

* * *

PHYSIOLOGICAL CHEMISTRY. A Textbook for Students. By Albert P. Mathews, Ph.D., Andrew Carnegie Professor of Biochemistry, University of Cincinnati. Sixth Edition, Illustrated. Baltimore: The Williams & Wilkins Company, 1939.

The first edition of this excellent book appeared nearly a quarter of a century ago. It has since increased in size and importance to the medical profession as each revision discussed the advances in this important branch of medical science. The subject of physiological chemistry is basic to all branches of medicine and surgery. The author truly says the biological sciences, and biochemistry not the least among these, are transforming medicine into a science. Certainty is replacing the art of guessing in the diagnosis and treatment of disease. We bespeak a hearty welcome for this sixth edition.

* * *

PRACTICAL MEDICAL DICTIONARY, Of Words used in Medicine with their Derivation and Pronunciation, including Dental, Veterinary, Chemical, Botanical, Electrical, Life Insurance and Other Special Terms. By Thomas Lathrop Stedman, M.D., and Stanley Thomas Garber, M.D. Fourteenth Revised Edition, Baltimore: Williams & Wilkins Co., 1939. Price, $7.50.

This posthumous work was almost completely revised before its famous author died. The completion of the details incident to publication are the work of his nephew. Perhaps no other work has accomplished so much towards the standardization of medical vocabularies as Stedman's Diction-

ary. An advancing science such as medicine soon outgrows its verbal garments. The fourteenth edition of Stedman is an up to the minutte authoritative dictionary, convenient in size, attractive in appearance, and easy to consult.

* * *

THE VITAMINS. A Symposium Arranged Under the Auspices of the Council on Pharmacy and Chemistry and the Council on Foods of the American Medical Association. Imitation leather. Price, $1.50 postpaid. pp. 637. Chicago: American Medical Association, 1939.

So much information has become available about the vitamins, that it is difficult even for experts to keep up with the literature. The present volume is a welcome compendium of authoritative information about these accessory food factors. There are discussions of the chemistry, physiology, pathology, pharmacology and therapeutics, methods of assay, food sources and human requirements of each of the important vitamins.

This book should prove to be an indispensable volume for the library of every physician.

* * *

FRACTURES. By Paul B. Magnuson, M.D., F.A.C.S., Associate Professor of Surgery, Northwestern University Medical School, Attending Suregon, Passavant Memorial Hospital and Wesley Memorial Hospital, Chicago. 317 illustrations, third edition, revised and enlarged. Price $5.00. Philadelphia: J. B. Lippincott Company, 1939.

The importance of this subject to the general practitioner and to the orthopedic surgeon is not likely to be overestimated. The physician in general practice is usually a man who first sees the fracture and it is for him particularly that the work has been written. So much depends upon proper initial treatment of fractures and so many factors require to be kept in mind that an authoritative work in the nature of a monograph is a welcome addition to the doctor's library. The book is well illustrated by means of photographs and radiographs. A third edition within three years bespeaks not only the popularity of the work but the author's ambition in keeping it up to date.

CORRESPONDENCE

Biography of Dr. Harvey Cushing

Editor Journal of the Michigan State Medical Society:

Mrs. Cushing has requested me to prepare a biography of her husband and I should be most grateful to anyone who wishes to make letters, anecdotes or other memorabilia available.

Copies of all letters, no matter how brief, are desired, and if dates are omitted it is hoped that, when possible, these may be supplied (*e.g.*, from the postmark). If original letters or other documents are submitted, they will be copied and returned promptly.

A new Medical Library building is being erected at the Yale University School of Medicine to receive Dr. Cushing's library and collections, including his letters, diaries and manuscripts. Any of his friends who wish, now or later, to present correspondence, photographs or other memorabilia for permanent preservation among the Cushing papers will receive the appreciative thanks of the University.

JOHN F. FULTON, M.D.,
Yale University School of Medicine,
333 Cedar Street, New Haven, Conn.

Among Our Contributors

Dr. D. A. Boyd is a graduate of the Jefferson Medical College of Philadelphia. He was Assistant Professor of Psychiatry at the University of Michigan Medical School, and at the present time is Professor of Psychiatry and Chairman of the Department of Neuropsychiatry, University of Indiana Medical School.

Dr. Aaron Dubnove is a graduate of the University of Manitoba, 1921. He served his internship at the Winnipeg Municipal Hospital, Ninette Tuberculosis Sanitarium and at St. Mary's Hospital, Detroit. He is in private practice in Detroit at the present time.

Dr. L. S. Griffith was graduated from Northwestern University Medical School in 1927, and served his internship at St. Luke's Hospital, Chicago. Later, he spent two years at the University of Pennsylvania, Graduate School of Medicine, receiving the degree of M.S. (Med.) in Gynecology. He located in Grand Rapids in 1932, and his practice is limited to gynecology and obstetrics.

John B. Krahl graduated from the University of Nebraska College of Medicine in 1937. He obtained a degree of Bachelor of Science from the University of Nebraska in 1936. Following an internship at the University of Nebraska Hospital, Omaha, Nebraska, he served one year as Resident in Pathology at Hurley Hospital, Flint, Michigan. At present he is engaged as Chief Resident at Hurley Hospital.

Dr. Earl G. Krieg was graduated from Wayne University in 1926. He is Junior Attending Surgeon, Woman's Hospital, Junior Associate Attending Surgeon at Receiving Hospital, Associate Attending Surgeon at the Blaine Hospital, and Assistant Attending Surgeon at Grace Hospital, Detroit. He is also an instructor at Wayne University Medical School.

Dr. Wm. S. Lovas was graduated from Wayne University in 1932. He is a member of the staffs of Delray Industrial and Woman's Hospitals, Detroit.

Dr. W. P. L. McBride is a graduate of the Medical College of Virginia, 1926. He was acting resident of pathology at Memorial Hospital, Richmond, Virginia, in 1926; assistant resident surgeon under Dr. T. P. Bloodgood in Baltimore in 1927; and Fellow in Surgery at the Mayo Clinic, Rochester, Minnesota, in 1927-30. At present, he is pathologist to Butterworth Hospital, Grand Rapids.

Dr. Carey P. McCord, occupational hygienist, is a graduate of the medical college of the University of Michigan, 1912. In 1936 he organized the Bureau of Industrial Hygiene of the Detroit Department of Health; until lately he was Director of this Bureau and the corresponding bureau of the Michigan Department of Health. He is Professor of Occupational Diseases at Wayne University Medical College and consultant to industry on occupational diseases and industrial hygiene.

Dr. David J. Sandweiss attended the University of Michigan from 1916 to 1923, during which time he received his B.S. in 1921 and his M.D. in 1923. He was interne at Michael Reese Hospital, Chicago, during 1924 and 1925. He is Assistant Physician at Harper Hospital, O.P.D.; Attending Physician in Gastro-enterology and Attending Physician in Gastroscopy at North End Clinic, Detroit. Dr. Sandweiss is also Instructor in Clinical Medicine at the Wayne University, College of Medicine and a Fellow of the American College of Physicians. His interest is gastro-enterology.

Dr. Harry C. Saltzstein received his Ph.B. from Yale University in 1910 and his M.D. from Johns Hopkins Medical School in 1914. He was interne and resident at the Mt. Sinai Hospital, New York City, from 1914 to 1917. He is Junior Attending Surgeon, Harper Hospital, and Chief and Attending Surgeon at North End Clinic, Detroit. He is a Fellow of the American College of Surgeons and a member of the American Society for the Study of Neoplastic Diseases.

Dr. Frederic Schreiber graduated from Harvard Medical School, 1923. He received his surgical training as assistant to Dr. Max Ballin, 1925-1928, and as assistant to Dr. Harvey Cushing, 1928 to 1929. He is professor of neurological surgery, Wayne University Medical School, and extramural lecturer in the postgraduate medical school, University of Michigan.

Dr. Marcus H. Sugarman received his A.B. from Wayne University in 1929 and his M.D. from Wayne University College of Medicine in 1934. He was interne from 1933 to 1935 at Receiving Hospital, Detroit. He is Junior Physician in Medicine at North End Clinic, Detroit.

Edwin P. Vary graduated from the University of Michigan Medical School in 1930. Following an internship at the Robert Packer Hospital and Guthrie Clinic at Sayre, Pennsylvania, he was engaged in private practice for five years at Niles, Michigan. During 1936-1938 he was Assistant Resident and Resident in the Department of Surgery at Ann Arbor, Michigan. During 1938-1939 he was Chief Resident Surgeon at Hurley Hospital, Flint, Michigan. He received a degree of Master of Science in Surgery from the University of Michigan Graduate School in 1939. At present he is engaged in a practice limited to general surgery at Flint, Michigan.

Dr. R. W. Waggoner is Professor of Psychiatry and Director of the Neuropsychiatric Institute, at the University Hospital, University of Michigan, Ann Arbor.

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COUNTY SOCIETIES

BRANCHES OF THE MICHIGAN STATE MEDICAL SOCIETY

COUNTY SOCIETY	PRESIDENT	SECRETARY	MEETING	
			Regular	Annual
Allegan	O. D. HUDNUTT Plainwell	E. B. JOHNSON Allegan	1st Tuesday	1st Tuesday December
Alpena-Alcona-Presque Isle	HAROLD KESSLER Alpena	E. S. PARMENTER Alpena	Last Thursday 6:00 p. m.	Last Thursday December
Barry	G. F. FISHER Hastings	THOMAS H. COBB Woodland	2nd Thursday 8:00 p. m.	1st Thursday January
Bay-Arenac-Iosco-Gladwin	L. FERNALD FOSTER Bay City	A. L. ZILIAK Bay City	2nd and 4th Wednesday (except July, Aug., Sept.) 6:00 p. m.	2nd Wednesday December
Berrien	DONALD THORUP Benton Harbor	R. C. CONYBEARE Benton Harbor	2nd Wednesday or Thursday	2nd Wednesday or Thursday, December
Branch	N. S. ALDRICH Coldwater	H. R. MOOI Union City	3rd Thursday 6:30 p. m.	3rd Thursday December
Calhoun	K. B. KEELER Albion	WILFRID HAUGHEY Battle Creek	1st Tuesday (except July and Aug.)	1st Tuesday December
Cass	E. H. ZWERGEL Cassopolis	GEO. LOUPEE Dowagiac	2nd Wednesday or Thursday	December 15
Chippewa-Mackinac	C. WILLISON Sault Ste. Marie	L. J. HAKALA Sault Ste. Marie	1st Thursday 7:30 p. m.	1st Thursday December
Clinton	A. C. HENTHORN St. Johns	T. Y. HO St. Johns	Last Tuesday (Oct. to June, incl.)	Last Tuesday October
Delta-Schoolcraft	OTTO S. HULT Gladstone	NATHAN J. FRENN Bark River	1st Thursday 8:30 p. m.	December 2
Dickinson-Iron	R. E. HAYES Sagola	D. R. SMITH Iron Mountain	1st Thursday 6:30 p. m.	1st Thursday December
Eaton	BERT VAN ARK Eaton Rapids	THOMAS WILENSKY Eaton Rapids	3rd Thursday	No set date
Genesee	GEORGE R. GOERING Flint	JOHN S. WYMAN Flint	2nd and 4th Tuesday (except July and August)	2nd Tuesday November
Gogebic	F. G. H. MALONEY Ironwood	F. L. S. REYNOLDS Ironwood	3rd Tuesday	3rd Tuesday December
Grand Traverse-Leelanau-Benzie	FREDERICK TRAUTMAN Frankfort	C. E. LEMEN Traverse City	1st Tuesday 8:00 p. m.	1st Tuesday December
Gratiot-Isabella-Clare	R. L. STRANGE Mt. Pleasant	C. F. DU BOIS Alma	3rd Thursday	3rd Thursday December
Hillsdale	G. R. HANKE Osseo	A. W. STROM Hillsdale	Last Thursday	Last Thursday December
Houghton-Baraga-Keweenaw	J. R. KIRTON Calumet	PAUL SLOAN Trimountain	1st Tuesday	1st Tuesday January
Huron-Sanilac	J. B. HENDERSON Pigeon	E. W. BLANCHARD Deckerville	2nd Thursday	2nd Thursday December
Ingham	L. G. CHRISTIAN Lansing	R. J. HIMMELBERGER Lansing	3rd Tuesday 6:30 p. m.	3rd Tuesday December
Ionia-Montcalm	W. L. BIRD Greenville	JOHN J. McCANN Ionia	2nd Tuesday 7:00 p. m.	2nd Tuesday December
Jackson	G. R. BULLEN Jackson	H. W. PORTER Jackson	3rd Tuesday 6:30 p. m.	2nd Tuesday Dec., 4:30 P. M.
Kalamazoo	RALPH B. FAST Kalamazoo	LOUIS W. GERSTNER Kalamazoo	3rd Tuesday 6:30 p. m.	3rd Tuesday December
Kent	Wm. R. TORGERSON Grand Rapids	JOHN M. WHALEN Grand Rapids	2nd and 4th Wednesday 8:15 p. m.	2nd Wednesday December
Lapeer	G. C. BISHOP Almont	C. C. JACKSON Imlay City	2nd Thursday	December or January
Lenawee	P. B. HARDY Tecumseh	ESLI T. MORDEN Adrian	3rd Tuesday	3rd Tuesday October
Livingston	GUY M. McDOWELL Howell	HAROLD C. HILL Howell	1st Friday 6:30 p. m.	1st Friday December
Luce	FRANK P. BOHN Newberry	M. A. SURRELL Newberry	1st Tuesday 8:00 p. m.	1st Tuesday December
Macomb	RUSSELL E. LYNCH Centerline	D. BRUCE WILEY Utica	1st Monday 12:00 noon	1st Monday December
Manistee	D. A. JAMIESON Arcadia	C. L. GRANT Manistee	Every Monday noon	1st Monday December
Marquette-Alger	R. G. JANES Marquette	D. P. HORNBOGEN Marquette	No set date	December
Mason	HOWARD B. HOFFMAN Ludington	R. OSTRANDER Ludington	2nd Tuesday	2nd Tuesday December
Mecosta-Osceola	PAUL B. KILMER Reed City	GLENN GRIEVE Big Rapids	2nd Tuesday	2nd Tuesday December

COUNTY SOCIETIES

Menominee	H. T. SETHNEY Menominee	WM. S. JONES Menominee	3rd Thursday	3rd Thursday December
Midland	NORMAN C. GREWE Midland	H. H. GAY Midland	2nd Thursday	2nd Thursday December
Monroe	W. W. BOND Monroe	FLORENCE AMES Monroe	3rd Thursday (except July and Aug.)	3rd Thursday October
Muskegon	C. L. A. ODEN Muskegon	LELAND E. HOLLY Muskegon	Last Friday 6:00 p. m.	2nd Friday December
Newaygo	H. R. MOORE Newaygo	W. H. BARNUM Fremont	As called	3rd Tuesday December
Northern Mich. (Antrim.-Charlevoix-Emmet-Cheboygan)	DEAN BURNS Petoskey	A. F. LITZENBURGER Boyne City	2nd Thursday 6:00 p. m.	2nd Thursday December
Oakland	GEORGE A. SHERMAN Pontiac	OTTO O. BECK Birmingham	1st Wednesday (except July and Aug.)	1st Wednesday December
Oceana	MERLE G. WOOD Hart	N. W. HEYSETT Hart	No definite date set	December
O.M.C.O.R.O. (Otsego-Montmorency-Crawford-Oscoda-Roscommon-Ogemaw)	M. A. MARTZOWKA Roscommon	C. G. CLIPPERT Grayling	On call	December
Ontonagon	W. F. STRONG Ontonagon	E. J. EVANS Ontonagon	On call	January
Ottawa	GERRIT KEMME Zeeland	D. C. BLOEMENDAAL Zeeland	2nd Tuesday Noon	2nd Tuesday December
Saginaw	SUEL A. SHELDON Saginaw	DALE E. THOMAS Saginaw	3rd Tuesday 8:30 p. m.	3rd Tuesday December
Shiawassee	E. J. CARNEY Durand	R. J. BROWN Owosso	3rd Thursday Noon	3rd Thursday December
St. Clair	E. W. MEREDITH Port Huron	JACOB H. BURLEY Port Huron	1st and 3rd Tuesdays Oct. to June	3rd Tuesday December
St. Joseph	ABEN HOEKMAN Constantine	JOHN W. RICE Sturgis	1st Thursday 6:30 p. m.	1st Thursday January
Tuscola	B. H. STARMANN Cass City	W. P. PETRIE Caro	2nd Thursday 8:00 p. m.	2nd Thursday November
Van Buren	WILLIAM BOPE Decatur	CHARLES TEN HOUTEN Paw Paw		
Washtenaw	JOHN W. KEMPER Ann Arbor	WM. M. BRACE Ann Arbor	2nd Tuesday	2nd Tuesday December
Wayne	RALPH H. PINO Detroit	WARREN B. COOKSEY Detroit	Every Monday 8:45 p. m. (Oct. to May, incl.)	3rd Monday in May
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THE JOURNAL

OF THE

Michigan State Medical Society

ISSUED MONTHLY UNDER THE DIRECTION OF THE COUNCIL

Volume 38 DECEMBER, 1939 No. 12 [Whole No. 446]

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12. Makes possible five types of Petrolagar to select from to meet the special needs of Bowel Management.

Petrolagar — Liquid petrolatum 65 cc. emulsified with 0.4 Gm. agar in a menstruum to make 100 cc.

Petrolagar

Petrolagar Laboratories, Inc. • 8134 McCormick Boulevard • Chicago, Illinois

Just Before the Can is Sealed . . .

To prevent oxidation or change in the physical or chemical composition of S.M.A., the atmosphere is exhausted from the container and is replaced with nitrogen which keeps the contents — S.M.A. — fresh and sweet in any climate.

The physical and chemical character of S.M.A. is always the same, providing a vitamin A, B_1, and D activity in each feeding that is constant throughout the year.

S.M.A. feedings are always uniform whether they are prepared in Maine or California.

NORMAL INFANTS RELISH S.M.A. — DIGEST IT EASILY AND THRIVE ON IT!

S.M.A. is a food for infants — derived from tuberculin tested cows' milk, the fat of which is replaced by animal and vegetable fats including biologically tested cod liver oil; with the addition of milk sugar and potassium chloride; altogether forming an antirachitic food. When diluted according to directions, it is essentially similar to human milk in percentages of protein, fat, carbohydrate and ash, in chemical constants of the fat and in physical properties.

ACCEPTED AMERICAN MEDICAL ASSN. Council on Foods

S.M.A. CORPORATION • 8100 McCORMICK BOULEVARD • CHICAGO, ILLINOIS